This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Minor, Municipal permit. The discharge results from the operation of a 0.016 MGD wastewater treatment plant. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011), updating permit language, as appropriate, to reflect current boilerplate, and addressing the re-rating of the WWTP. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260-00 et seq.

1.	Facility Name and Mailing Address:	North Spring Behavioral Healthcare WWTP 42009 Victory Lane Leesburg, VA 20176	SIC Code :	4952 WWTP
	Facility Location:	42009 Victory Lane Leesburg, VA 20176	County:	Loudoun
	Facility Contact Name:	Mr. David Winters	Telephone Number:	(703) 777-0800
2.	Permit No.:	VA0067938	Expiration Date of previous permit:	February 24, 2010
	Other VPDES Permits associated with this facility:		N/A	
	Other Permits associated with this facility:		N/A	
	E2/E3/E4 Status:	N/A		
3.	Owner Name:	North Spring Behavioral Healthcare		
	Owner Contact/Title:	Mr. David Winters / Chief Executive Officer	Telephone Number:	(703) 777-0800
4.	Application Complete Date:	January 29, 2010		

Permit Drafted By:	Susan Mackert	Date Drafted:	February 25, 2010
Permit Drafted By:	Susan Mackert	Date Drafted:	May 24, 2010
Draft Permit Reviewed By:	Alison Thompson	Date Reviewed:	March 3, 2010
Draft Permit Reviewed By:	Alison Thompson	Date Reviewed:	May 26, 2010
Draft Permit Reviewed By:	Bryant Thomas	Date Reviewed:	June 16, 2011
Public Comment Period :	Start Date: June 30, 2011	End Date:	July 29, 2011

5. Receiving Waters Information:

Receiving Stream Name	Limestone Branch, UT	Stream Code:	1aXGJ
Drainage Area at Outfall:	0 square miles	River Mile:	1.33
Stream Basin:	Potomac River	Subbasin:	Potomac River
Section:	8	Stream Class:	III
Special Standards:	PWS	Waterbody ID:	VAN-A03R
7Q10 Low Flow:	0 MGD	7Q10 High Flow:	0 MGD
1Q10 Low Flow:	0 MGD	1Q10 High Flow:	0 MGD
Harmonic Mean Flow:	0 MGD	30Q5 Flow:	0 MGD
303(d) Listed:	No	30Q10 Flow:	0 MGD
TMDL Approved:	Yes	Date TMDL Approved:	July 6, 2004 (bacteria)

It is staff's best professional judgement that based on a drainage area of 5 sq.mi or less, critical flows will be equal to 0.

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

✓	State Water Control Law		EPA Guidelines
✓	Clean Water Act	✓	Water Quality Standards
✓	VPDES Permit Regulation		Other
✓	EPA NPDES Regulation		

7. Licensed Operator Requirements: Class IV

8. Reliability Class: Class I

9. Permit Characterization:

✓	Private	✓	Effluent Limited		Possible Interstate Effect
	Federal	✓	Water Quality Limited		Compliance Schedule Required
	State		Toxics Monitoring Program Required		Interim Limits in Permit
	POTW		Pretreatment Program Required		Interim Limits in Other Document
✓	TMDL				

10. Wastewater Sources and Treatment Description:

North Spring Behavioral Healthcare is a 77-bed residential treatment facility serving adolescents. The facility's WWTP has previously been permitted at 0.01 MGD. Recently the WWTP has been experiencing flows greater than the design capacity authorized by the permit. In response, the owner had Loudoun Water's engineers perform an engineering analysis to evaluate the capacity of the facility. This evaluation resulted in a re-rating of the design flow of the WWTP from 0.10 MGD to 0.016 MGD. The engineering analysis is found in Attachment 1. The CTO for the 0.016 MGD re-rating will be issued concurrently with the 2011 permit.

The plant receives domestic and commercial/industrial wastewater from the North Spring Behavioral Healthcare facility. Flow is conveyed from the facility to the WWTP via gravity sewer and two pump stations. The North Spring Behavioral Health Center WWTP process consists of a 4,400 gallon grease trap followed by 4,200 gallon flow equalization (EQ) basin. Submersible, constant-speed influent pumps within the EQ basin discharge to a flow splitter box. The flow splitter box utilizes v-notch and rectangular weirs to discharge a fixed portion of the influent flow to two 4,400 gallon aeration tanks (in series) while the remainder of influent flow is returned to the EQ basin. Flow is then routed to a single clarifier furnished with sludge pumps and air-lift scum skimmer followed by chlorination using sodium hypochlorite and tablet dechlorination.

See Attachment 2 for a facility schematic/diagram.

TABLE 1 – Outfall Description

Outfall Number	Discharge Sources	Treatment	Design Flow	Outfall Latitude and Longitude
001	Domestic Wastewater	See Item 10 above.	0.016 MGD	39° 08' 05? N 77° 34' 04? W
See Attachment 3 for (Waterford, DEQ #215A) topographic map.				

11. Sludge Treatment and Disposal Methods:

The North Spring Behavioral Health Center WWTP utilizes aerobic digestion. The facility has two sludge holding tanks of 1,900 gallons and 4,500 gallons, respectively. Digested sludge is then pumped and hauled by A&M Septic of Summerduck, VA (License #2705096806) to the Broad Run WRF (VA0091383) for additional treatment.

12. Discharges, Intakes, Monitoring Stations, Other Items in Vicinity of Discharge: The facilities and monitoring stations listed below either discharge to or are located within the following waterbody: VAN-A03R

TABLE 2	
1aXGJ000.42	DEQ monitoring station located approximately 1.0 rivermiles downstream of the discharge location near the Selma Lane bridge crossing.
VA0021750	Lucketts Elementary School (Limestone Branch, UT)
VA0061280	VICA STP (Clark's Run)
VA0074934	One Stop Trailer Park (Potomac Run, UT)
VA0074942	Hiway Mobile Home Park (Limestone Branch, UT)
VA0088196	Raspberry Falls Sewage Treatment Plant (Limestone Branch)
VA0090573	Beacon Hill Water Treatment Plant (Limestone Branch, UT)

13. Material Storage:

TABLE 3 - Material Storage		
Materials Description	Volume Stored	Spill/Stormwater Prevention Measures
D-Chlor Tablets (81.3% Sodium Sulfite)	Minimal Quantity on Site	None
Sodium Hypochlorite (12.5% Liquichlor)	2 – 4 drums	None

14. Site Inspection: Performed by Susan Mackert and Doug Frasier on November 17, 2009. The site visit confirms that the application packages received on July 14, 2009, and January 20, 2010, are accurate and representative of actual site conditions. The site visit memo can be found as Attachment 4.

15. Receiving Stream Water Quality and Water Quality Standards:

a) Ambient Water Quality Data

The nearest Department of Environmental Quality ambient monitoring station, 1aXGJ000.42, is located in segment VAN-A03R_XGJ01A04 approximately 0.91 rivermiles downstream from the outfall location. The receiving stream, VAN-A03R_XGJ01A04, is not listed on the current 303(d) list.

The 2008 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report (IR) gives an impaired classification for the following downstream location.

- Recreation Use Impairment

The Unnamed Tributary to Limestone Branch (XGJ) feeds into Limestone Branch. Limestone Branch, from its headwaters down to the confluence of the Potomac River, is listed as impaired for not meeting the recreational designated use due to elevated levels of *E. coli* bacteria. Sufficient excursions from the maximum *E. coli* bacteria criterion (11 of 31 samples - 35.5%) were recorded at DEQ's ambient water

quality monitoring station (1aLIM001.16) at the Route 15 crossing to assess this stream segment as not supporting of the recreation use goal for the 2010 water quality assessment.

The following Total Maximum Daily Loads (TMDLs) have been established.

- Limestone Branch Recreation Use – Approved by EPA 7-6-04
- Limestone Branch Recreation Use – Modified by EPA on 3-10-10

The Limestone Branch bacteria TMDL did not specifically include the Unnamed Tributary to Limestone Branch (XGJ). However, all upstream discharges were taken into account when developing the TMDL. As such, the facility received a WLA of 1.74×10^{10} cfu/year for *E. coli* since it is an upstream source. The *E. coli* TMDL was approved by EPA on July 6, 2004.

The TMDL did include a growth factor to account for future expansions of point sources. With this reissuance the facility has asked for an expansion to 0.016 MGD. The TMDL was modified on March 10, 2010, to account for the increase in flow. At the 0.016 MGD flow, the facility received a WLA of 2.79×10^{10} cfu/year for *E. coli*.

b) Receiving Stream Water Quality Criteria

Part IX of 9 VAC 25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, Limestone Branch, UT, is located within Section 8 of the Potomac River Basin, and classified as a Class III water.

At all times, Class III waters must achieve a dissolved oxygen (D.O.) of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, a temperature that does not exceed 32°C, and maintain a pH of 6.0-9.0 standard units (S.U.).

Attachment 5 details other water quality criteria applicable to the receiving stream.

Ammonia:

The 7Q10 and 1Q10 of the receiving stream are 0.0 MGD. In cases such as this, effluent pH and temperature data may be used to establish the ammonia water quality standard. In response to the facility's re-rating, staff re-evaluated the effluent pH data used to establish the ammonia criteria and subsequent effluent limits in the previous permit. The 90th percentile pH was determined to be 8.4 S.U. based on a review of the 2007 – 2009 Discharge Monitoring Reports (DMRs). Because effluent temperature data was not available, a default temperature value of 25° C was used to calculate the ammonia water quality criteria for this reissuance.

Metals Criteria:

The Water Quality Criteria for some metals are dependent on the receiving stream's hardness (expressed as mg/l calcium carbonate). The 7Q10 of the receiving stream is zero, no ambient data is available, and there is no hardness data for this facility. Staff guidance suggests using a default hardness value of 50 mg/l $CaCO_3$ for streams east of the Blue Ridge. The hardness-dependent metals criteria in Attachment 4 are based on this in-stream value.

Bacteria Criteria: The Virginia Water Quality Standards (9VAC25-260-170 A.) states that the following criteria shall apply to protect primary recreational uses in surface waters:

1) *E. coli* bacteria per 100 ml of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean[1]
Freshwater *E. coli* (N/100 ml)	126

[1]For a minimum of four weekly samples [taken during any calendar month].

c) Receiving Stream Special Standards

The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Limestone Branch, UT, is located within Section 8 of the Potomac River Basin. This section has been designated with a special standard of PWS.

Special Standard PWS designates a public water supply intake. The Board's Water Quality Standards establish numerical standards for specific parameters calculated to protect human health from toxic effects through drinking water and fish consumption. See 9VAC25-260-140 B for applicable criteria.

d) Threatened or Endangered Species

The Virginia DGIF Fish and Wildlife Information System Database was searched on September 2, 2009, for records to determine if there are threatened or endangered species in the vicinity of the discharge. Threatened or endangered species were identified within a 2 mile radius of the discharge. The limits proposed in this draft permit are protective of the Virginia Water Quality Standards and therefore, protect the threatened and endangered species found near the discharge.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on the stream having a 7Q10 and 1Q10 of zero. At times, the stream is comprised entirely of effluent. It is staff's best professional opinion that the instream waste concentration is 100% during critical stream flows, and that the water quality of the stream will mirror the quality of the effluent. Permit limits proposed have been established by determining wasteload allocations which will result in attaining and/or maintaining all water quality criteria which apply to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points is equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards (WQS) are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLA) are calculated. In this case since the critical flows 7Q10 and 1Q10 have been determined to be zero, the WLA's are equal to the WQS. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. Effluent limitations are based on the most limiting WLA, the required sampling frequency, and statistical characteristics of the effluent data.

a) Effluent Screening:

Effluent data obtained from the permit application and DMRs has been reviewed and determined to be suitable for evaluation.

The following pollutants require a wasteload allocation analysis: Ammonia as Nitrogen and Total Residual Chlorine.

b) Mixing Zones and Wasteload Allocations (WLAs):

Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA = \frac{C_o [Q_e + (f) (Q_s)] - [(C_s) (f) (Q_s)]}{Q_e}$$

Where:
- WLA = Wasteload allocation
- C_o = In-stream water quality criteria
- Q_e = Design flow
- Q_s = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; harmonic mean for carcinogen-human health criteria; 30Q10 for ammonia criteria, and 30Q5 for non-carcinogen human health criteria)
- f = Decimal fraction of critical flow
- C_s = Mean background concentration of parameter in the receiving stream.

The water segment receiving the discharge via Outfall 001 is considered to have a 7Q10 and 1Q10 of 0.0 MGD. As such, there is no mixing zone and the WLA is equal to the C_o.

c) Effluent Limitations Toxic Pollutants, Outfall 001 –

9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D. requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N:

Upon evaluation of effluent pH values reported on the 2007 – 2009 DMRs, it was determined that the 90th percentile pH value was 8.4 S.U. A default temperature value of 25° C was used to calculate the ammonia water quality criteria for this reissuance.

Due to the re-rating of the facility and subsequent increase in flow, the discharge can no longer be considered intermittent. A review of daily operational logs from 2008 and 2009 confirm that the effluent flow is continuous. As such, both the acute and chronic criteria are applied. As a result, a proposed ammonia limitation of 1.3 mg/L was calculated. The previous reissuance established a limitation of 11.9 mg/L based on acute criteria only. A review of 2007 – 2009 DMRs indicates the facility can achieve compliance with this proposed limitation.

See Attachment 5 for the derivation of ammonia limitations.

2) Total Residual Chlorine:

Chlorine is used for disinfection and is potentially in the discharge. Staff calculated WLAs for TRC using current critical flows. In accordance with current DEQ guidance, staff used a default data point of 0.2 mg/L and the calculated WLAs to derive limits. A monthly average limit of 0.009 mg/L and a weekly average limit of 0.010 mg/L were derived for this discharge (see Attachment 5).

However, the previous reissuance established a monthly average limitation of 0.008 mg/L and a weekly average limitation of 0.010 mg/L. Antibacksliding provisions do not allow relaxation of limitations. As such, the current monthly average limitation of 0.008 mg/L and a weekly average limitation of 0.010 mg/L shall be carried forward.

d) Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants

No changes to dissolved oxygen (D.O.), and pH limitations are proposed.

Changes to biochemical oxygen demand-5 day (BOD_5), and total suspended solids (TSS) limitations are proposed.

The existing dissolved oxygen and BOD_5 permit limitations are based on stream modeling conducted in December 1983 and June 1988 (Attachment 6a and Attachment 6b, respectively) and are set to meet the water quality criteria for D.O. in the receiving stream.

Since the facility requested an increase in flow, DEQ again ran the Regional Dissolved Oxygen Model to determine if revised limitations for BOD_5, and dissolved oxygen were warranted (Attachment 6c). The model contained one segment. The model used is a steady state stream D.O. model based on the belief that the discharge is continuous in nature. The steady state stream D.O. model predicts the dissolved oxygen conditions in the receiving stream downstream of the discharge.

The model was run at the increased flow of 0.016 MGD. For the 0.016 MGD flow, a $CBOD_5$ limit of 15 mg/L and a minimum D.O. requirement of 6.5 mg/L are protective of the dissolved oxygen requirement. It is staff's best professional judgement that a monthly average BOD_5 limit of 15 mg/L is protective of the dissolved oxygen requirement since BOD encompasses both the carbonaceous and nitrogenous forms. As such, a monthly average BOD_5 limit of 15 mg/L and a weekly average BOD_5 limit of 22 mg/L are proposed with this reissuance. These limits protect the dissolved oxygen minimum in the Water Quality Standards.

It is staff's practice to equate the Total Suspended Solids limits with the BOD_5 limits. TSS limits are established to equal BOD_5 limits since the two pollutants are closely related in terms of treatment of domestic sewage. As such, a monthly average TSS limit of 15 mg/L and a weekly average TSS limit of 22 mg/L are proposed with this reissuance.

pH limitations are set at the water quality criteria.

E. coli limitations are in accordance with the Water Quality Standards 9VAC25-260-170.

e) Effluent Limitations and Monitoring Summary.

The effluent limitations are presented in the following table. Limits were established for BOD_5, Total Suspended Solids, Ammonia, pH, Dissolved Oxygen, *E. coli*, and Total Residual Chlorine.

The limit for Total Suspended Solids is based on Best Professional Judgement.

The mass loading (kg/d) for monthly and weekly averages were calculated by multiplying the concentration values (mg/l), with the flow values (in MGD) and a conversion factor of 3.785.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal for BOD and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal. As such, annual influent BOD and TSS monitoring are not necessary.

18. Antibacksliding:

All limits in this permit are at least as stringent as those previously established. Backsliding does not apply to this reissuance.

19. Effluent Limitations/Monitoring Requirements: Outfall 001

Design flow is 0.016 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	2	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
Biochemical Oxygen Demand (BOD_5)	2,4	15 mg/L 0.91 kg/day	22 mg/L 1.3 kg/day	NA	NA	1/M	Grab
Total Suspended Solids (TSS)	1	15 mg/L 0.91 kg/day	22 mg/L 1.3 kg/day	NA	NA	1/M	Grab
Ammonia, as N (mg/L)	2	1.3 mg/L NA	1.3 mg/L NA	NA	NA	1/M	Grab
Dissolved Oxygen (DO)	2,4	NA	NA	6.5 mg/L	NA	1/D	Grab
Total Residual Chlorine (after contact tank)	1, 2, 3	NA	NA	1.5 mg/L	NA	1/D	Grab
Total Residual Chlorine (after dechlorination)	2	0.008 mg/L	0.01 mg/L	NA	NA	1/D	Grab
E. coli (Geometric Mean)[(a)]	2	126 n/100mls	NA	NA	NA	1/W	Grab

The basis for the limitations codes are:

1. Best Professional Judgement
2. Water Quality Standards
3. DEQ Disinfection Guidance
4. Stream Model- Attachment 5

MGD = Million gallons per day.
N/A = Not applicable.
NL = No limit; monitor and report.
S.U. = Standard units.
TIRE = Totalizing, indicating and recording equipment.

1/D = Once every day.
1/M = Once every month.
1/W = Once every week between 10am and 4pm.

Grab = An individual sample collected over a period of time not to exceed 15-minutes.

(a) The permittee shall sample and submit *E. coli* results at the frequency of once every week for six (6) months.

If all reported results for *E. coli* do not exceed 126 n/100mL, reported as the geometric mean, the permittee may submit a written request to DEQ-NRO for a reduction in the sampling frequency to once per quarter.

Upon approval, the permittee shall collect four (4) samples during one month within each quarterly monitoring period as defined below. The results shall be reported as the geometric mean.

The quarterly monitoring periods shall be January through March, April through June, July through September and October through December. The DMR shall be submitted no later than the 10th day of the month following the monitoring period.

Should any of the quarterly monitoring results for *E. coli* exceed 126 n/100mL, reported as the geometric mean, the monitoring frequency shall revert to once per week for the remainder of the permit term.

20. Other Permit Requirements :

a) Part I.B. of the permit contains additional chlorine monitoring requirements, quantification levels and compliance reporting instructions.
These additional chlorine requirements are necessary per the Sewage Collection and Treatment Regulations at 9VAC25-70 and by the Water Quality Standards at 9VAC25-260-170. A minimum chlorine residual must be maintained at the exit of the chlorine contact tank to assure adequate disinfection. No more that 10% of the monthly test results for TRC at the exit of the chlorine contact tank shall be <1.0 mg/L with any TRC <0.6 mg/L considered a system failure. Monitoring at numerous STPs has concluded that a TRC residual of 1.0 mg/L is an adequate indicator of compliance with the *E. coli* criteria. *E. coli* limits are defined in this section as well as monitoring requirements to take effect should an alternate means of disinfection be used.

9VAC25-31-190.L.4.c. requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D. requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

21. Other Special Conditions :

a) 95% Capacity Reopener. The VPDES Permit Regulation at 9VAC25-31-200.B.4. requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. The facility is a PVOTW.

b) Indirect Dischargers. Required by VPDES Permit Regulation, 9VAC25-31-200 B.1. and B.2. for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

c) O&M Manual Requirement. Required by Code of Virginia §62.1-44.19; Sewage Collection and Treatment Regulations, 9 VAC 25-790; VPDES Permit Regulation, 9 VAC 25-31-190.E. The permittee shall submit for approval an Operations and Maintenance (O&M) Manual or a statement confirming the accuracy and completeness of the current O&M Manual to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO) by November 4, 2011. Future changes to the facility must be addressed by the submittal of a revised O&M Manual within 90 days of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

d) CTC, CTO Requirement. The Code of Virginia § 62.1-44.19; Sewage Collection and Treatment Regulations, 9VAC25-790 requires that all treatment works treating wastewater obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

f) Licensed Operator Requirement. The Code of Virginia at §54.1-2300 et seq. and the VPDES Permit Regulation at 9VAC25-31-200 C, and Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.) requires licensure of operators. This facility requires a Class IV operator.

g) Reliability Class. The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a reliability Class of I.

h) Sludge Reopener. The VPDES Permit Regulation at 9VAC25-31-220.C. requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the CWA. The facility includes a sewage treatment works.

i) Sludge Use and Disposal. The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2., and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works treating domestic sewage.

j) Treatment Works Closure Plan. The State Water Control Law §62.1-44.15:1.1, makes it illegal for an owner to cease operation and fail to implement a closure plan when failure to implement the plan would result in harm to human health or the environment. This condition is used to notify the owner of the need for a closure plan where a facility is being replaced or is expected to close.

Permit Section Part II. Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a) Special Conditions:

1) A Treatment Works Closure Plan reopener was added to the permit.

b) Monitoring and Effluent Limitations:

1) The monthly average NH_3 limit was revised from 11.9 mg/L to 1.3 mg/L and the weekly average NH_3 limit was revised from 11.9 mg/L to 1.3 mg/L based on the development of new ammonia criteria.
2) The monthly average BOD_5 limit was revised from 30 mg/L to 15 mg/L and the weekly average BOD_5 limit was revised from 45 mg/L to 22 mg/L based on the Regional Dissolved Oxygen Model to ensure protection of the dissolved oxygen requirement.
3) The monthly average BOD_5 loading was revised from 1.1 kg/day to 0.91 kg/day and the weekly average BOD_5 loading was revised from 1.17 kg/day to 1.3 kg/day based on the Regional Dissolved Oxygen Model to ensure protection of the dissolved oxygen requirement.
4) The monthly average TSS limit was revised from 30 mg/L to 15 mg/L and the weekly average TSS limit was revised from 45 mg/L to 22 mg/L as it is staff's practice to equate the TSS limits with the BOD_5 limits.
5) The monthly average TSS loading was revised from 1.1 kg/day to 0.91 kg/day and the weekly average TSS loading was revised from 1.17 kg/day to 1.3 kg/day as it is staff's practice to equate the TSS limits with the BOD_5 limits.
6) Sampling frequency for *E. coli* has been increased from 1/6M to 1/W for a period of six (6) months to comply with the WLA provisions of the TMDL and with the current Water Quality Standards. The permittee may request a reduction in sampling frequency for *E. coli* after a successful demonstration period. See Section 19 of the Fact Sheet for additional information.

24. Variances/Alternate Limits or Conditions: N/A

25. Public Notice Information:

First Public Notice Date: June 29, 2011 Second Public Notice Date: July 6, 2011

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3853, susan.mackert@deq.virginia.gov. See Attachment 7 for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are

substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment

26. 303 (d) Listed Stream Segments and Total Max. Daily Loads (TMDL):

The nearest Department of Environmental Quality ambient monitoring station, 1aXGJ000.42, is located in segment VAN-A03R_XGJ01A04 approximately 0.91 rivermiles downstream from the outfall location. The receiving stream, VAN-A03R_XGJ01A04, is not listed on the current 303(d) list.

The 2010 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report (IR) gives an impaired classification for a downstream location, Limestone Branch. The Limestone Branch bacteria TMDL did not specifically include the Unnamed Tributary to Limestone Branch (XGJ). However, all upstream discharges were taken into account when developing the TMDL. The facility received a WLA of 1.74×10^{10} cfu/year for *E. coli* for the 0.010 MGD facility. The *E. coli* TMDL was approved by EPA on July 6, 2004.

The TMDL did include a growth factor to account for future expansions of point sources. At the 0.016 MGD flow, the facility receives a WLA of 2.79×10^{10} cfu/year for *E. coli*. The *E. coli* TMDL was modified by EPA on March 10, 2010. The proposed bacteria limitations should not contribute to the further impairment downstream of this discharge.

TMDL Reopener: This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

27. Additional Comments:

Previous Board Action(s): None

Staff Comments: Permit reissuance was delayed for the following reasons:

- The existing permit was modified in December 2009 to reflect a change of ownership from Loudoun Water to North Spring Behavioral Healthcare.
- The new owner had Loudoun Water's engineers perform an engineering analysis to re-rate the design flow of the WWTP from 0.01 MGD to 0.016 MGD. The draft re-rating evaluation report was received by DEQ-NRO in January 20, 2010.
- Significant public interest in the Raspberry Falls STP permit (VA0088196), which discharges to Limestone Branch.

Public Comment: No comments were received.

EPA Checklist: The checklist can be found in Attachment 7.

Fact Sheet Attachments – Table of Contents

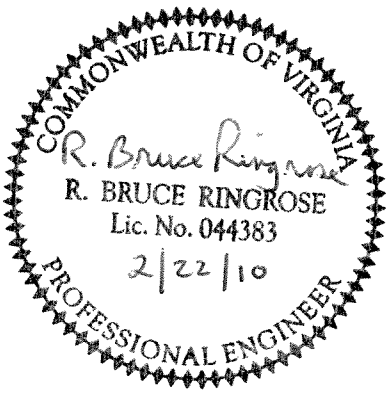
North Spring Behavioral Healthcare WWTP
VA0067938

2011 Reissuance

LOUDOUN WATER

NORTH SPRING BEHAVIORAL HEALTHCARE

Evaluation of the Re-Rating of the Wastewater Treatment Plant



February 2010

Table of Contents

I. INTRODUCTION

A. Purpose

This report on the North Spring Behavioral Healthcare Wastewater Treatment Plant (WWTP) has been prepared to examine the performance of the plant and demonstrate the capability of the plant to adequately treat an increased waste flow. Currently the North Spring WWTP is permitted to receive and treat 10,000 gallons per day (gpd) of wastewater discharged from the North Spring facility. Additions and changes to the facility over time have increased the daily volume of flow to the point where the WWTP permit limit of 10,000 gpd is exceeded several times per month.

B. Contents

This report presents historic data on current waste flows and treated effluent quality. Current raw waste load data is also presented, along with calculations of process loading to demonstrate the capability of the plant to effectively handle a larger waste flow.

II. BACKGROUND

A. North Spring Facility

The North Spring facility was initially constructed in 1977. The facility provides care to children ages 9 to 18. The facility consists of three principal buildings that contain offices, rooms for 77 residents, a laundry, and a kitchen. These are the sources of wastewater flow to the WWTP (See Figure 1).

Specific sources of wastewater flow are:

- Kitchen – three meals per day provided
- Bathrooms – total of 42 bathrooms in three buildings
- Resident's laundry – five washers for personal clothing
- Building cleaning activities

Flow is conveyed to the WWTP through gravity sewers and two sewage pumping stations.

B. North Spring Wastewater Treatment Plant

The WWTP was constructed in 1985 and a certificate to operate (No. VA0067938) was issued by the Virginia State Water Control Board in November 1985. Prior to this, wastewater disposal was accomplished by septic tanks and subsurface disposal.

The initial plant construction consisted of two, 4,400-gallon aeration basins in series, a single 12.5-foot deep, dual hopper clarifier, an 850-gallon chlorine contact tank, and a 1,900-gallon aerated sludge holding tank. The plant is provided with two air-lift pumps for sludge return, and one air-lift skimmer. The design was based on the extended aeration modification of the activated sludge process (See Figure 2 and Figure 3).

Permit limits established for the WWTP effluent are:

Flow - 10, 000 gpd (average)
BOD5 - 30 mgl = 2.42 lb/day (average)
TSS - 30 mgl = 2.42 lb/day (average)
CL2 - 1.0 mgl (maximum)

Treated flow is discharged via outfall to an unnamed tributary of Limestone Branch.

Problems experienced at the WWTP during the first years of operation included frequent variations of flow and heavy quantities of grease from the kitchen. The variation in flow caused occasional violations of the chlorine residual permit limit.

In 1990 and 1991 improvements were constructed at the WWTP, including a 4,400-gallon septic tank/grease trap, a 4,200-gallon equalization (EQ) basin, a

flow proportioning splitter box on the discharge from the EQ basin to the first aeration basin, and a tablet dechlorination unit to prevent violations of the chlorine residual permit limit.

C. Virginia DEQ Warning Notice

In September 2009, the Virginia Department of Environmental Quality (VADEQ) provided a warning notice that the monthly average flow for the WWTP had reached 95 percent of the permitted capacity, and requested a plan of action to address the potential permit violation.

III. CURRENT CONDITIONS

A. North Spring Behavioral Healthcare Facility

As described previously, the facility consists of three principal buildings generating domestic-type wastewater from various sources. The present population of the facility includes a total of 70 residents (with a maximum of 72 possible), and 150 staff in three shifts (daytime-105, evenings-35, overnight-10). Total number of bedrooms available is 77, but North Spring staff has determined that the maximum number of residents should not exceed 72. The kitchen provides three meals per day. At present, meals are served with paper service to reduce wastewater flows. The kitchen has a commercial dishwasher which allows for meals to be served with full service.

Bed linens, towels and other institutional laundry items are sent out for cleaning. Five washer/dryer sets are provided for residents to wash personal clothing. The total number of bathrooms in the facility includes about 22 full bathrooms for the residents and 20 half-bathrooms for staff. An extensive program of cleaning and maintenance is practiced using strong disinfectants and cleaners. No evidence has been observed that the cleaners impact the operation of the WWTP. The wastewater can be typified as domestic with a fairly consistent diurnal flow pattern caused by the regulated nature of activities within the facility.

B. Wastewater Characteristics

Samples of the raw waste flow entering the plant are not normally collected. For this report several grab samples of the waste flow were taken from the flow splitter box to characterize the waste load entering the secondary treatment units. These samples do not accurately reflect the total raw waste load to the WWTP. The results of this sampling effort are presented in Table 1.

C. North Spring WWTP

Presently the WWTP consists of the following treatment components (See Figure 3 and Figure 4):

- 4,400-gallon grease trap
- 4,200-gallon equalization basin
- duplex, submersible, constant-speed, influent pumps in the EQ basin discharging to the flow splitter box
- a flow splitter box which uses v-notch and rectangular weirs to discharge a fixed portion of influent flow to the aeration basins while the remainder is returned to the EQ basin
- two 4,400-gallon aeration tanks in series
- a single, dual-hopper, clarifier furnished with two, 3-inch, air-lift sludge pumps for sludge return and an air-lift scum skimmer
- an 850-gallon chlorine contact tank and sodium hypochlorite feed system
- a tablet Dechlorinator unit
- effluent flow meter
- two, aerated, sludge holding tanks (1,900 gallons and 4,500 gallons)

Flow from the kitchen is discharged to the grease trap, which then discharges to the EQ basin. All other flow is discharged direct to the EQ basin.

The flow splitter box was added as part of the plant improvements in 1990 and 1991. Using a 60-degree V-notch weir and an adjustable rectangular weir, each time the influent pumps cycle on, the flow is split with about 15-20 gpm going

into aeration and the remainder (about 70 gpm) returning to the EQ basin. The purpose of the splitter box is to reduce the surge of flow into the aeration basin due to the overly large influent pumps. The splitter box does not act to reduce diurnal peaks because the returned flow is added to the incoming flow, which shortens the pump's off cycle (See Figure 6).

The equalization basin is currently not utilized due to high maintenance costs and thus provides only a small storage volume for proper cycling of the influent pumps. Table 2 presents a detailed list of the existing process components and calculated process loadings. A review of the tabulated data indicates that the plant components are only lightly to moderately loaded.

Treated effluent characteristics for the first eight months of 2009 are presented in Table 3. The data demonstrates the excellent treatment provided by the North Spring WWTP, particularly in view of the fact that the EQ basin is not being utilized, and several days of flow above the permit limit had no impact on effluent quality.

IV. PROPOSED CONDITIONS

A. North Spring Behavioral Healthcare Facility

The facility has enacted several measures to reduce wastewater flow but cannot identify any further practicable reductions. Currently the kitchen is using paper service for meals to reduce the dishwater waste flow.

To accommodate the increased flow from the facility, and provide some reserve capacity for possible future expansions or changes, a new wastewater flow permit limit of 16,000 gpd is recommended.

B. North Spring WWTP

The WWTP has been evaluated with respect to its ability to properly treat the proposed increase in permitted flow to 16,000 gpd. Table 4 presents a summary

of the calculations and proposed process loadings on the existing WWTP components. The data demonstrate that all process loadings remain within the normal range of commonly accepted guidelines (Ref: Virginia SCAT Regulations – 2/12/04, Metcalf & Eddy – 3rd Edition, WEF – MOP #8 – 1992). The only exception to this is the aeration basin detention time which reduces from 18 hours to 13 hours. This change, however, does not appear to be significant as numerous days have occurred with flows in the 13,000 to 15,000 range with no decrease in performance.

V. CONCLUSIONS and RECOMMENDATIONS

A. Conclusions

1. Wastewater flows from the North Spring Behavioral Healthcare facility have increased and specific adjustments to current operations have reduced the flow to a practical minimum.
2. The current WWTP components operate in a stable and reliable manner and provide excellent treatment of the wastewater flow, even when flow exceeds the permit limit.
3. The WWTP consistently discharges BOD5 and TSS well below the permitted limits.

B. Recommendations

1. Revise the WWTP permit limit for flow from 10,000 gpd to 16,000 gpd with a peak hourly flow of 40,000 gpd.

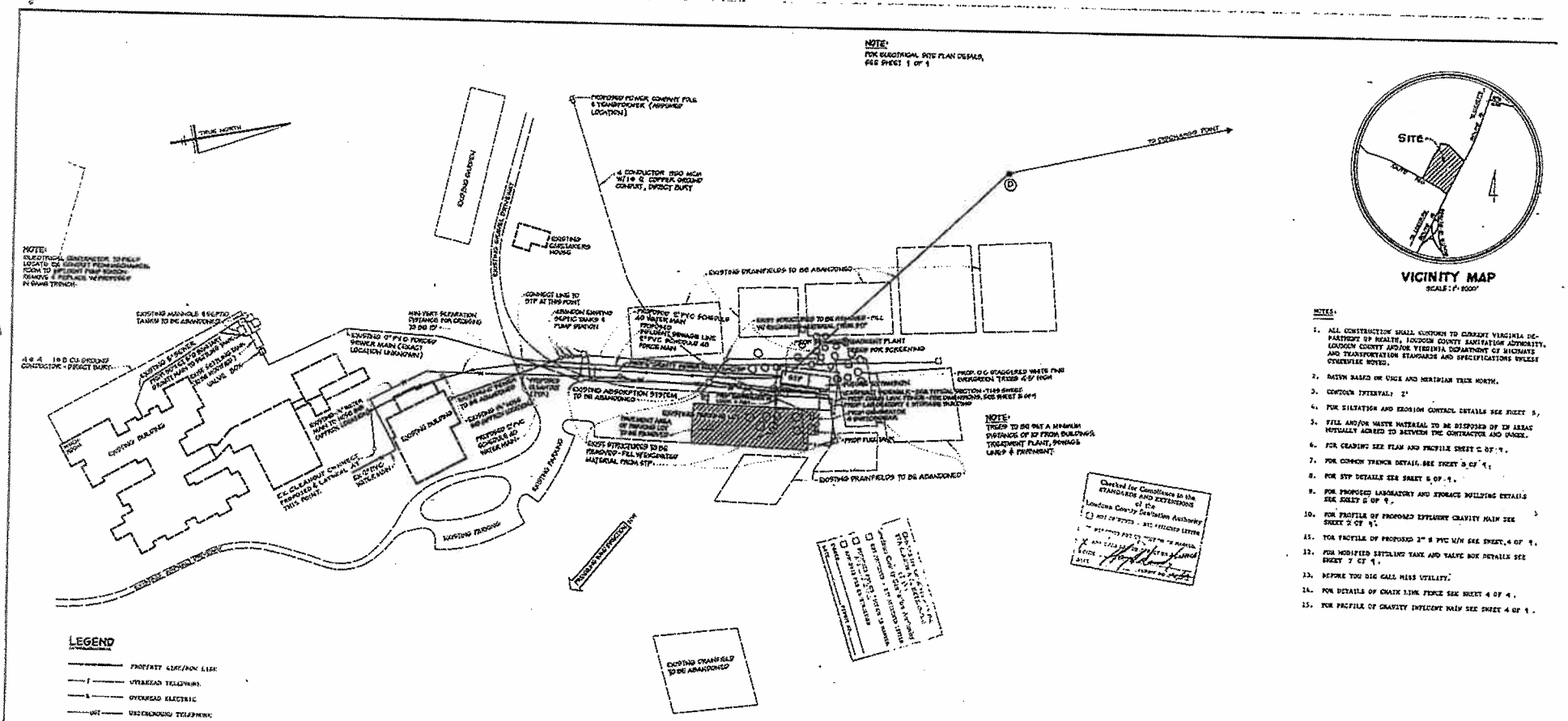
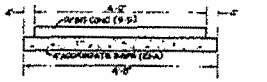


FIGURE 1

SITE PLAN



* ALL SIDEWALKS SHALL BE PLACED ON WELL COMPACTED FILL. DEPTH OVER EXISTING EARTH SHALL MEET OR EXCEED DEPTH SHOWN. SIDEWALK SHALL BE WELL DRAINED

NOTES:

1. ALL CONSTRUCTION SHALL CONFORM TO CURRENT VIRGINIA DEPARTMENT OF HEALTH, LOUDOUN COUNTY SANITATION AUTHORITY, LOUDOUN COUNTY AND/OR VIRGINIA DEPARTMENT OF HIGHWAYS AND TRANSPORTATION STANDARDS AND SPECIFICATIONS UNLESS OTHERWISE NOTED.
2. DATUM BASED ON USGS AND MERIDIAN TRUE NORTH.
3. CONTOUR INTERVAL: 2'
4. FOR SILTATION AND EROSION CONTROL DETAILS SEE SHEET 8.
5. FILL AND/OR WASTE MATERIAL TO BE DISPOSED OF IN AREAS MUTUALLY AGREED TO BETWEEN THE CONTRACTOR AND OWNER.
6. FOR CLEARING SEE PLAN AND PROFILE SHEET 2 OF 9.
7. FOR COMMON TRENCH DETAIL SEE SHEET 9 OF 9.
8. FOR STP DETAILS SEE SHEET 5 OF 9.
9. FOR PROPOSED LABORATORY AND STORAGE BUILDING DETAILS SEE SHEET 6 OF 9.
10. FOR PROFILE OF PROPOSED EFFLUENT GRAVITY MAIN SEE SHEET 2 OF 9.
11. FOR PROFILE OF PROPOSED 2" & PVC W/M SEE SHEET 4 OF 9.
12. FOR MODIFIED SETTLING TANK AND VALVE BOX DETAILS SEE SHEET 7 OF 9.
13. BEFORE YOU DIG CALL MISS UTILITY.
14. FOR DETAILS OF CHAIN LINK FENCE SEE SHEET 4 OF 4.
15. FOR PROFILE OF GRAVITY INFLUENT MAIN SEE SHEET 4 OF 9.

SHEET INDEX

SHEET 1

COMMONWEALTH OF VIRGINIA — 9961 — PROFESSIONAL ENGINEER

COMMONWEALTH OF VIRGINIA — C. TERRY TITUS — CERTIFICATE No. 1318 — LICENSED LAND SURVEYOR

REVISIONS		DATE: 6-86
8-6-86 REVISED PER COMMENTS 9-15-86 PER ELECTRICAL & COMMENTS 9-19-86 PER REVISION 10-17-86 PER ENGINEERS COMMENTS	OVERALL SITE PLAN	SCALE: 1"=50'
	SPRINGWOOD AT LEESBURG	DRAWN: MM
	CATOCTIN MAGISTERIAL DISTRICT LOUDOUN COUNTY, VIRGINIA	DESIGN: RW
		CHECK:

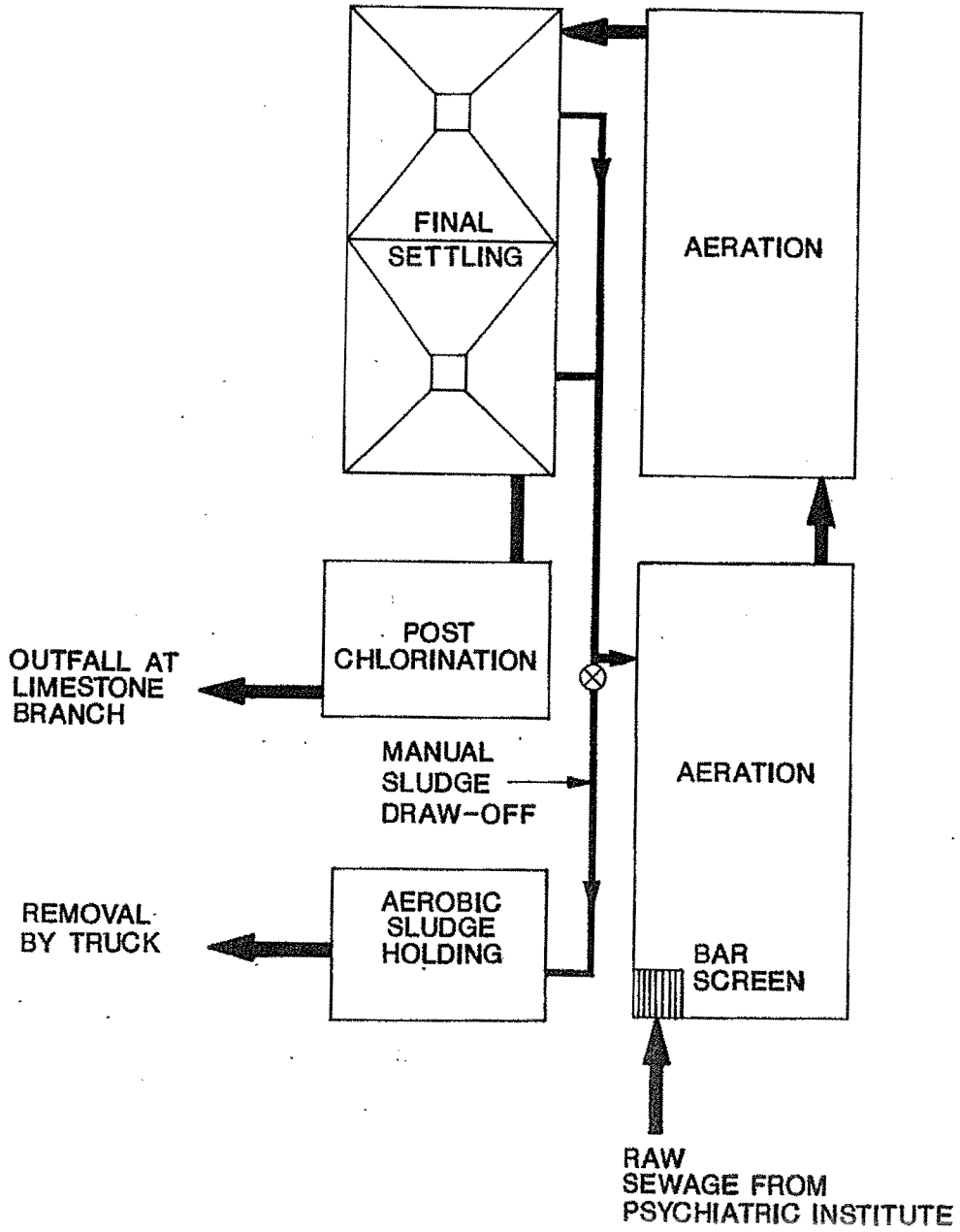
BENGTSON, DeBELL, ELKIN & TITUS
A PROFESSIONAL CORPORATION
CONSULTING ENGINEERS, SURVEYORS & PLANNERS
CINCINNATI & LEESBURG, VIRGINIA — SILVER SPRING, MARYLAND

JOB NO. VA 5976 E 6R W.O. NO. 6305-9-C SHEET 1 OF 9

Springwood at Leesburg

(17)

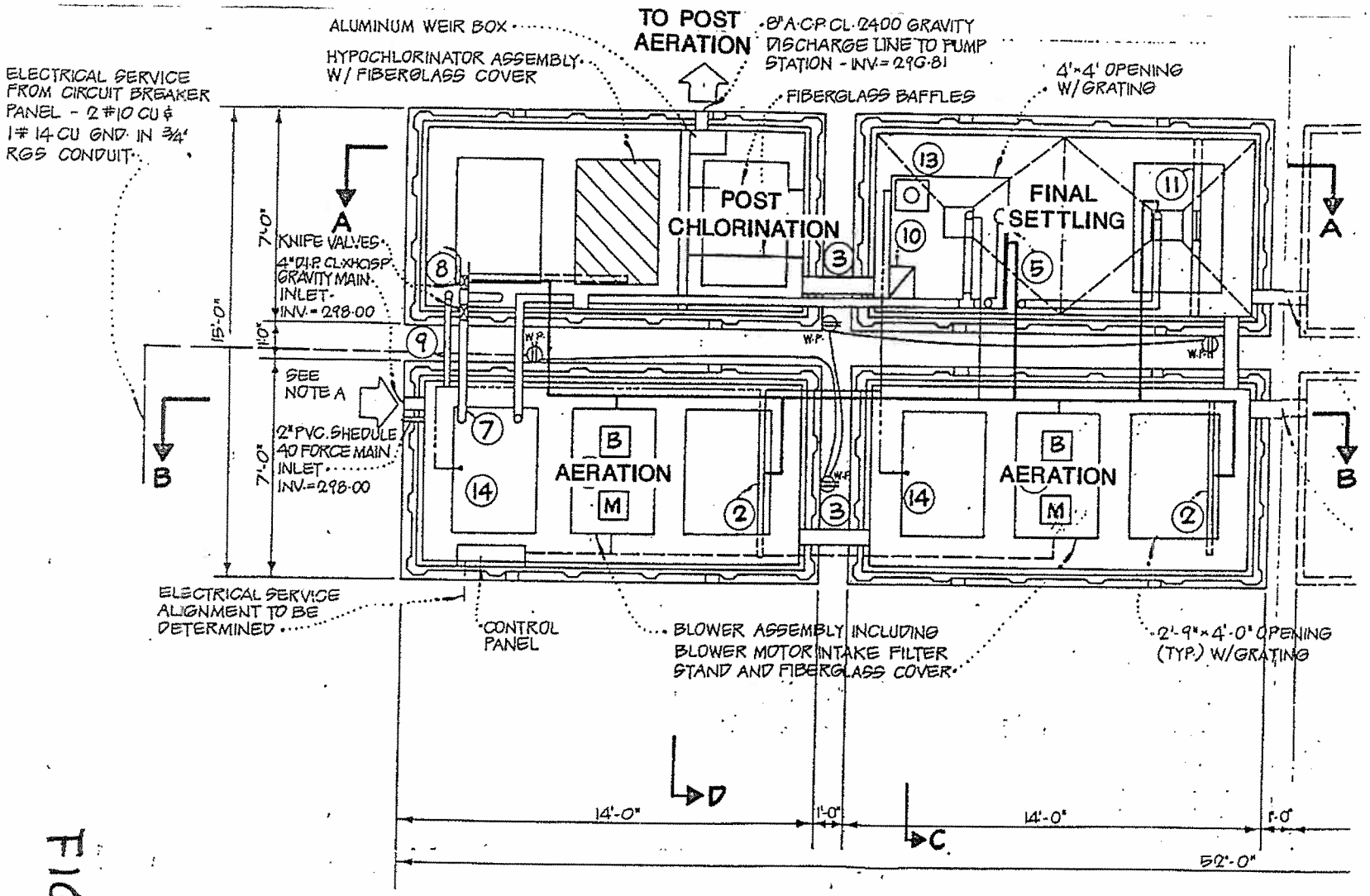
SPRINGWOOD PSYCHIATRIC INSTITUTE
WASTEWATER TREATMENT PLANT



ORIGINAL
PROCESS FLOW DIAGRAM

FIGURE 2

BOET



PLAN VIEW

REVISED 7-6-84 PER LCSA

FIGURE 3

ORIGINAL

TREATMENT PLANT PLAN VIEW

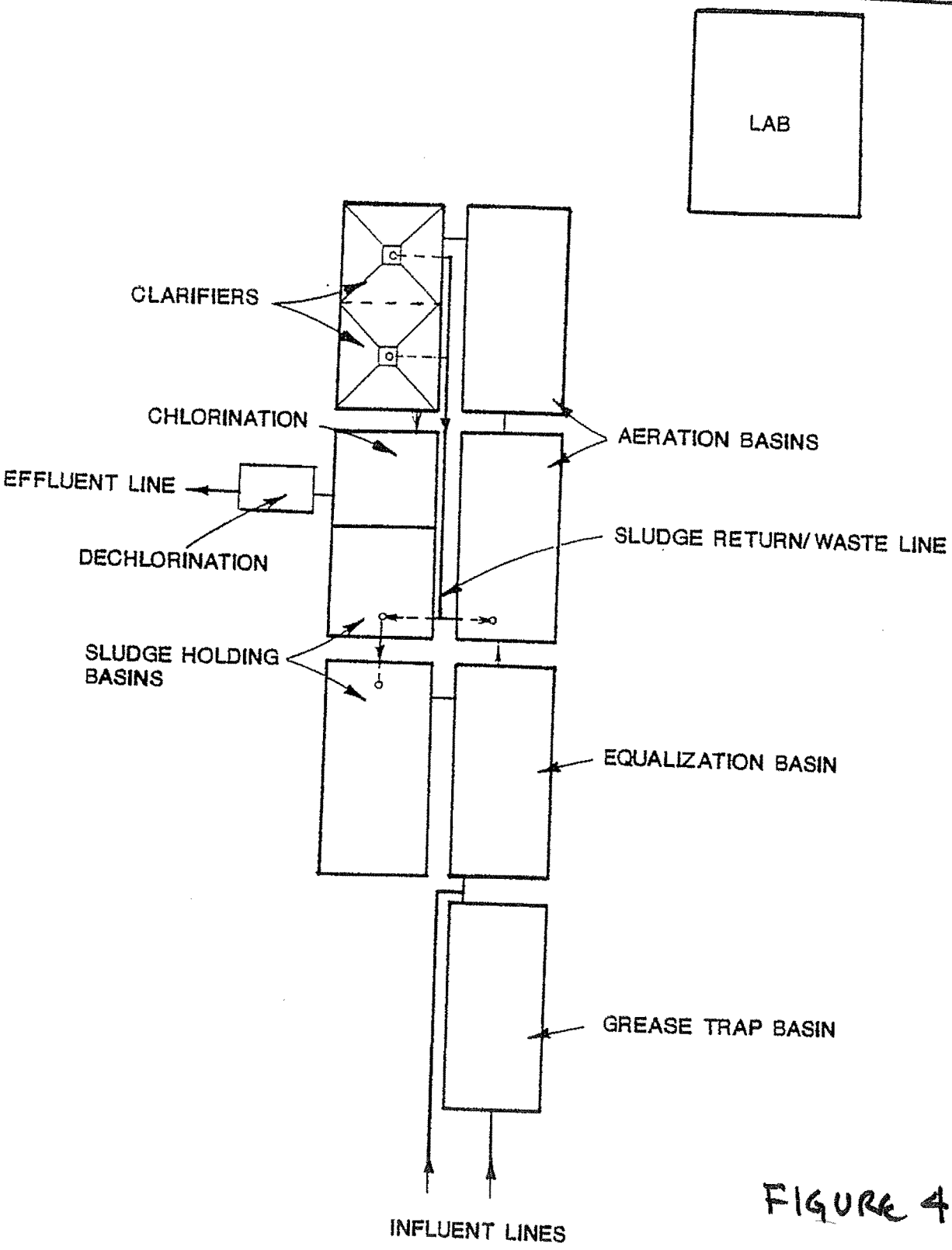


FIGURE 4

CURRENT

PROCESS FLOW DIAGRAM

SPRINGWOOD PSYCHIATRIC INSTITUTE
WASTEWATER TREATMENT PLANT

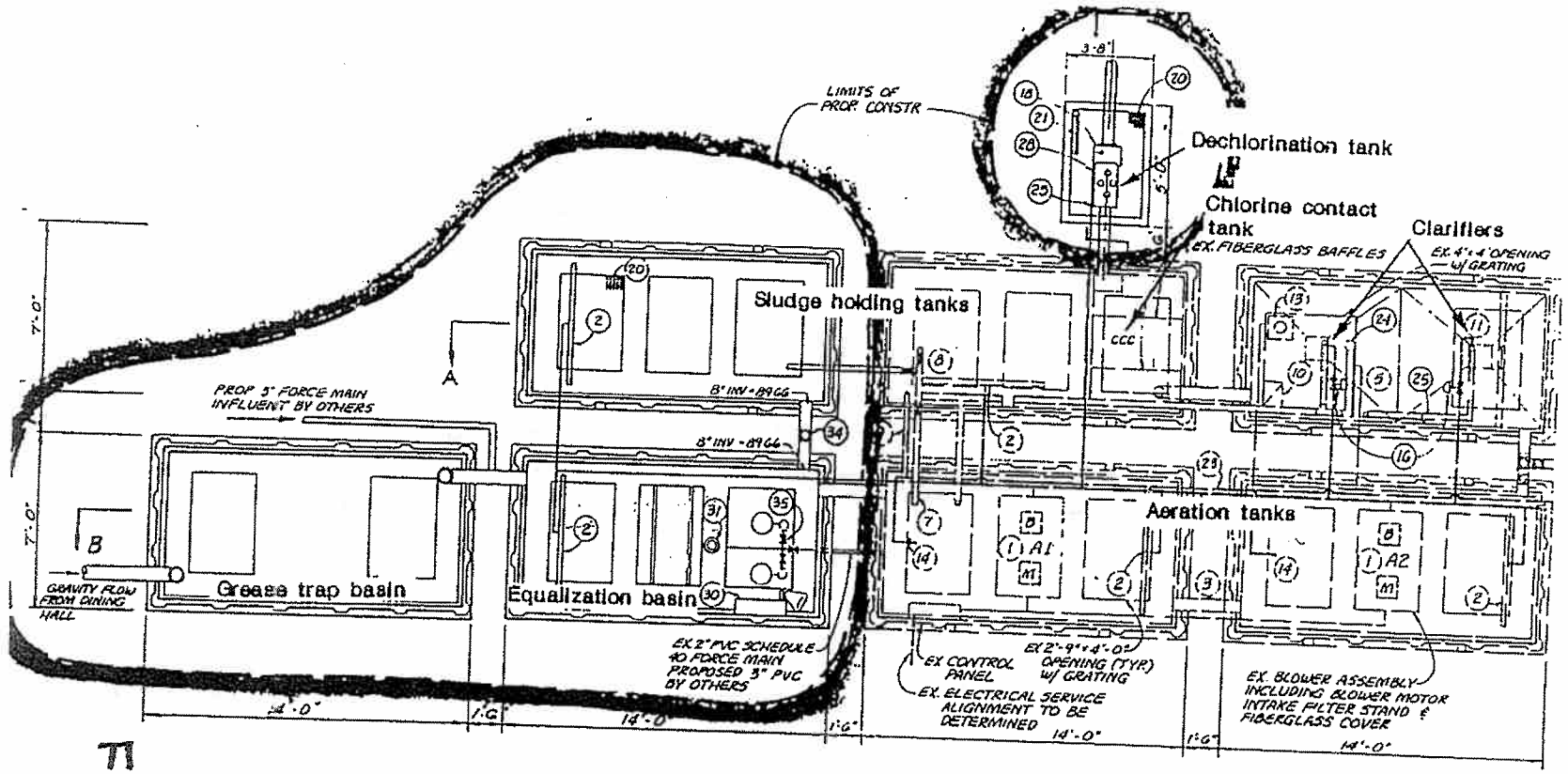
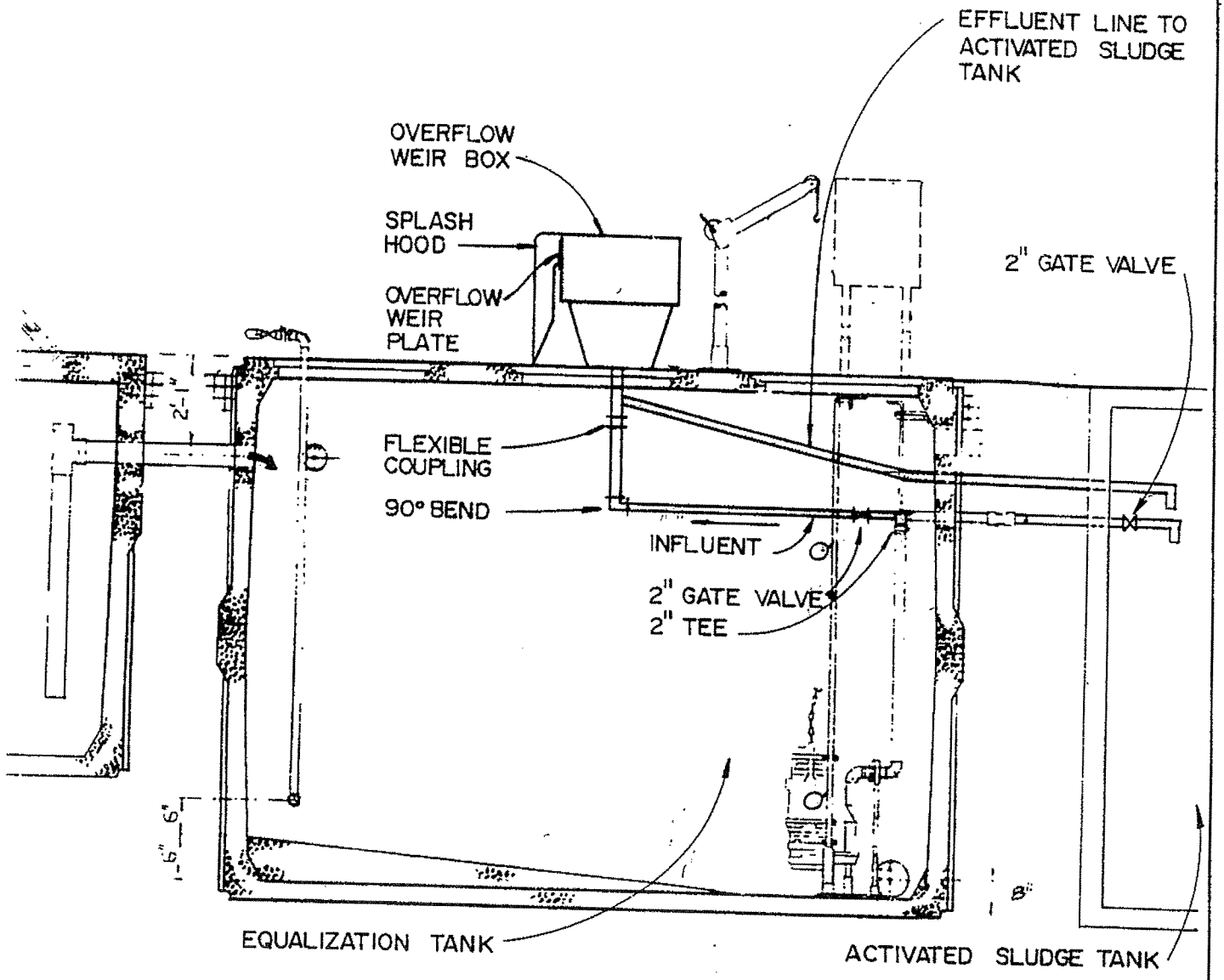


FIGURE 5

CURRENT

WASTEWATER TREATMENT PLANT

Plan View



SECTION
N.T.S.

FIGURE 6

REV. 12-10-90

BDET ENGINEERS SURVEYORS, PLANNERS & LANDSCAPE ARCHITECTS

SPRINGWOOD EQUALIZATION SECTION

SPRINGWOOD PSYCHIATRIC INSTITUTE

PROJ. NO.

DATE 6-21-90

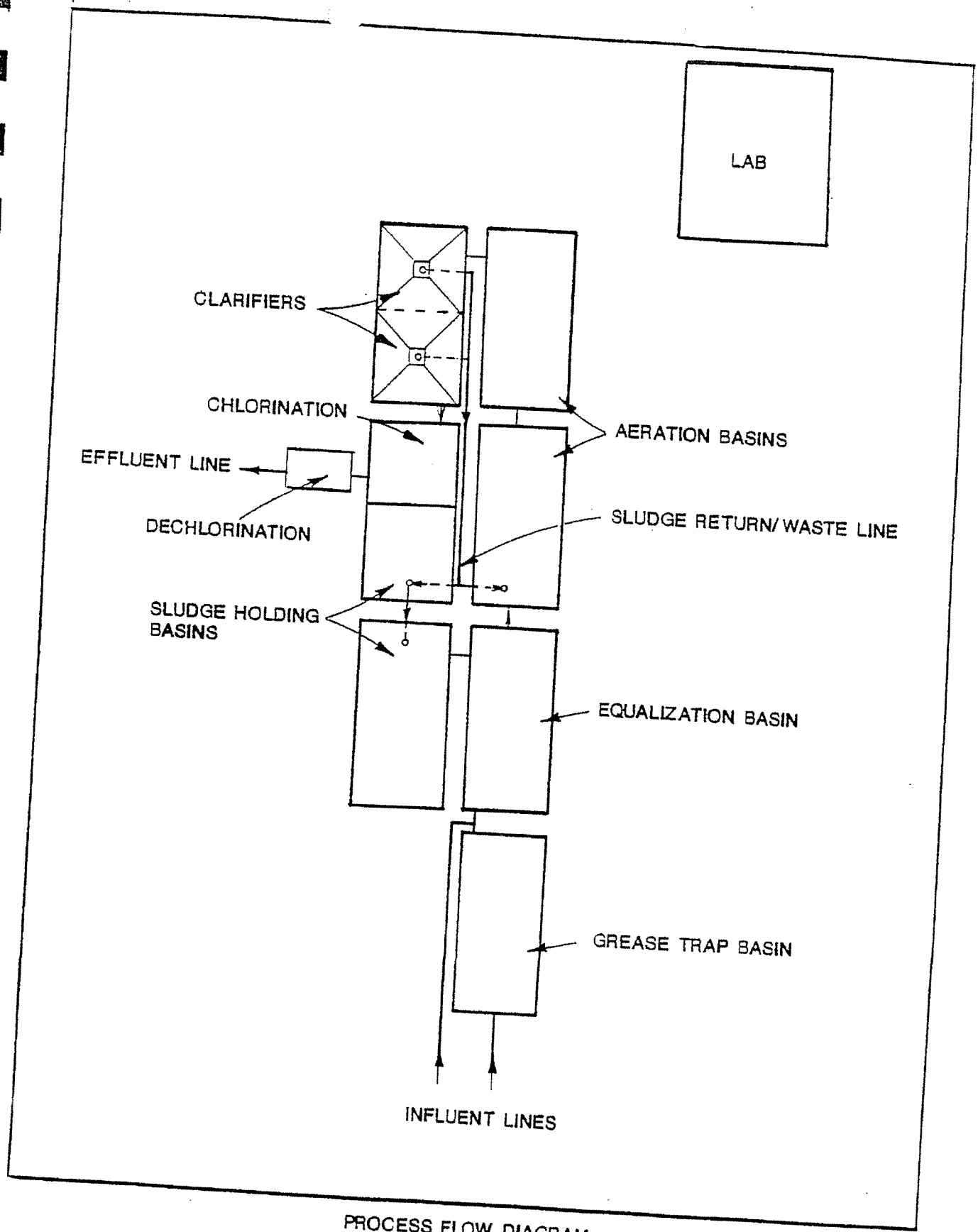
North Spring WWTP						
Table 1 – Waste Load to Activated Sludge Process						
Date	Time	Flow	BOD5		TSS	
		gpd	mgl	lbs/day	mgl	lbs/day
8/5/09	10:00 am	6,640	n/a	n/a	56	0.5
11/17/09	9:50 am	12,120	185	18.7	286	28.9
	10:30 am		157	15.7	304	30.7
11/18/09	10:00 am	8,670	64	4.6	194	14.0
	11:30 am		89	6.4	232	16.8
	12:15 pm		77	5.6	208	15.0
11/19/09	6:00 am	19,690	58	9.5	152	25.0
	6:45 am		77	12.6	168	27.6
Average			101	10.4	200	19.8

Note: The samples were collected at the influent to the Aeration Basin (following the Grease Trap and Equalization Basin) to reflect loads to the activated sludge process and do not reflect the actual raw waste load to the entire WWTP.

North Spring WWTP		
Table 2 - Process Components and Existing Loadings		
Unit	Size and/or Type	Process Loading
Septic Tank Grease Trap	Capacity = 4,400 Gallons	Detention = 9.7 Hrs
Equalization Basin	Capacity = 4,200 Gallons **Not in Use**	Capacity is 42% of Average Daily Flow Mixing Air Supplied @ 30 CFM/1,000 CF = 17 CFM
Flow Splitter Box	60 Degree, V-Notch Weir 18-Inch Rectangular Weir	Flow Rate to Aeration = 15-20 GPM Flow Rate Returned to Equalization = 70 GPM
Aeration Basins Two Basins In Series	Total Volume = 8,800 Gallons MLSS = 4,300 MGL SVI = 90-100	Volumetric Loading = 7.7 Lb BOD5/1,000 CF F/M = 0.04 Lb BOD5/ Lb MLVSS (75% Active Biomass) Detention Time = 18 Hrs
Aeration Blowers	Diffused Air w/ Two PD Blowers Each 120 CFM (one unit standby)	Aeration Air Supplied @ 2100 CF/ Lb BOD5 Applied = 16 CFM 3-Inch Sludge Return Air Lifts @ 10-20 CFM Each Skimmer @ 5 CFM EQ Basin + Sludge Holding Mixing Air = 51 CFM Total Air Supplied = 102 CFM
Secondary Clarifier	Single Tank w/ Two Hoppers Surface Area = 73 SF SWD = 12 FT Return Sludge – Two, 3-Inch Air Lift Pumps 8-Inch Diameter Skimmer	Surface Overflow Rate = 375 GPD/SF at Peak Hour Flow Solids Loading = 12 Lb/Day/SF at Peak Hour Flow Sludge Return Air Lift = 7,500-30,000 GPD
Chlorine Contact Tank	Volume = 850 Gallons	Detention Time = 45 Minutes at Peak Hour Flow
Tablet Dechlorinator	Maximum Capacity = 50,000 GPD	Peak Hour Flow Rate = 27,250 GPD
Aerated Sludge Holding	Capacity = 6,400 Gallons	Storage = 80 Days @ Waste Rate = 80 GPD Mixing Air Supplied @ 40 CFM/1,000 CF = 34 CFM

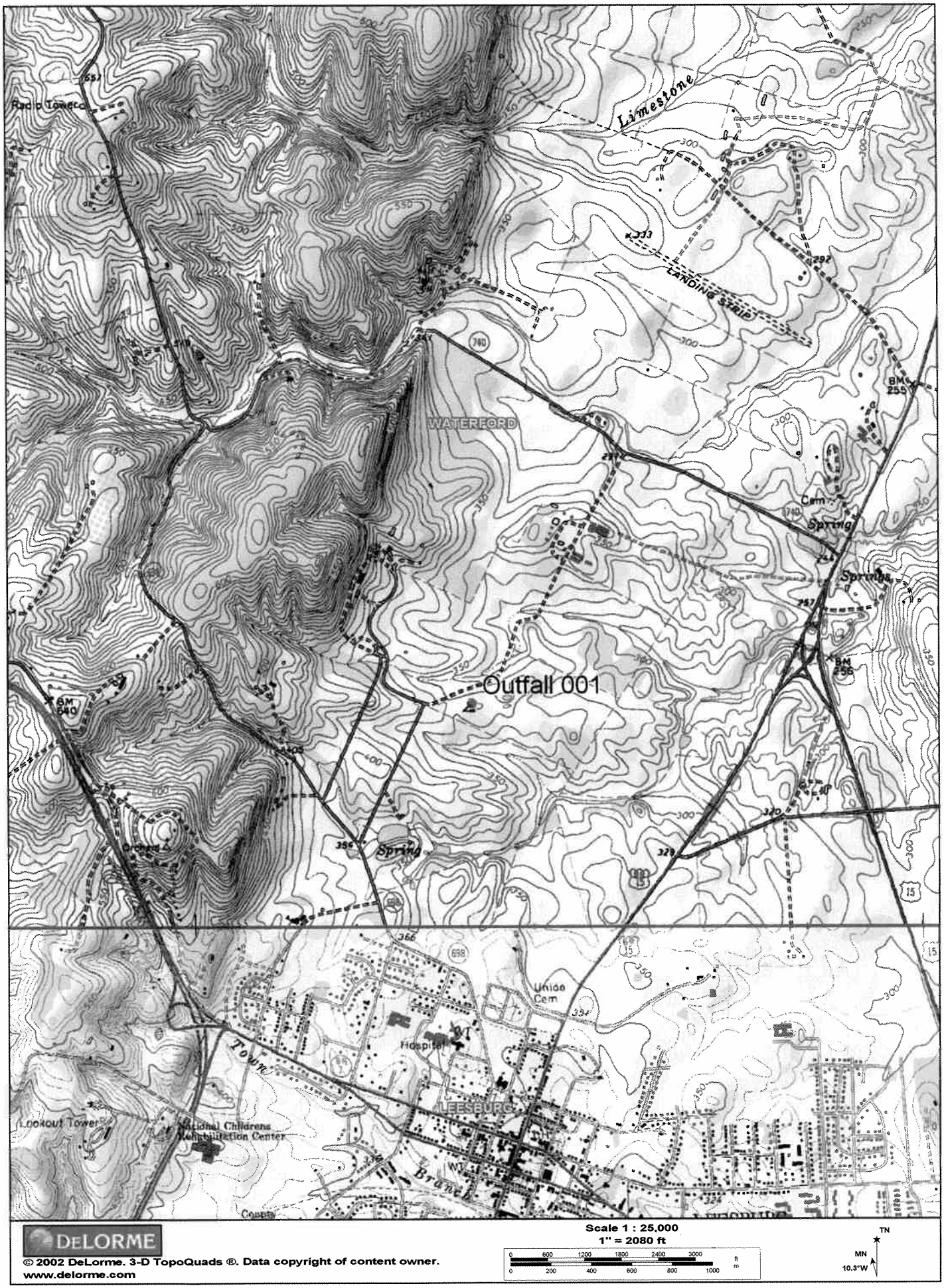
North Spring WWTP		
Table 3 - Process Components and Proposed Loadings		
Unit	Size and/or Type	Process Loading
Septic Tank Grease Trap	Capacity = 4,400 Gallons	Detention = 6.6 Hrs
Equalization Basin	Capacity = 4,200 Gallons **Not in Use**	Capacity is 25% of Average Daily Flow Mixing Air Supplied @ 30 CFM/1,000 CF = 17 CFM
Flow Splitter Box	60 Degree, V-Notch Weir 18-Inch Rectangular Weir	Flow Rate to Aeration = 25-30 GPM Flow Rate Returned to Equalization = 90 GPM
Aeration Basins Two Basins In Series	Total Volume = 8,800 Gallons MLSS = 4,300 MGL SVI = 90-100	Volumetric Loading = 11 Lb BOD5/1,000 CF F/M = 0.06 Lb BOD5/ Lb MLVSS (75% Active Biomass) Detention Time = 13 Hrs
Aeration Blowers	Diffused Air w/ Two PD Blowers Each 120 CFM (one unit standby)	Air Supplied @ 2100 CF/ Lb BOD5 Applied = 24 CFM 3-Inch Sludge Return Air Lifts @ 20-30 CFM Each Skimmer @ 5 CFM EQ Basin + Sludge Holding Mixing Air = 51 CFM Total Air Supplied = 110 CFM
Secondary Clarifier	Single Tank w/ Two Hoppers Surface Area = 73 SF SWD = 12 FT Return Sludge – Two, 3-Inch Air Lift Pumps 8-Inch Diameter Skimmer	Surface Overflow Rate = 550 GPD/SF at Peak Hour Flow Solids Loading = 20 Lb/Day/SF at Peak Hour Flow Sludge Return Air Lift = 12,000-36,000 GPD
Chlorine Contact Tank	Volume = 850 Gallons	Detention Time = 30 Minutes at Peak Hour Flow
Tablet Dechlorinator	Maximum Capacity = 50,000 GPD	Peak Hour Flow Rate = 40,000 GPD
Aerated Sludge Holding	Capacity = 6,400 Gallons	Storage = 53 Days @ Waste Rate = 120 GPD Mixing Air Supplied @ 40 CFM/1,000 CF = 34 CFM

North Spring WWTP				
Table 4 – 2009 Treated Effluent Characteristics				
Date	Flow	BOD5	TSS	NH3-N
	gpd	mgl	mgl	mgl
1/7/09	10,100	1.1	9.6	0.2
1/21/09	7,360	3.0	6.0	0.2
1/31/09	11,510			
2/25/09	8,700	13.0	12.0	0.6
2/28/09	10,800			
3/11/09	19,990	2.0	2.0	1.0
3/31/09	6,450			
4/8/09	10,540	2.0	4.0	0.5
4/30/09	14,860			
5/6/09	13,410	3.9	ND	0.1
5/31/09	15,390			
6/10/09	14,000	2.6	3.5	1.6
6/30/09	9,340			
7/8/09	8,130	1.5	1.2	ND
7/31/09	6,540			
8/5/09	6,640	1.5	2.2	0.3
Average	10,860	3.4	4.5	0.5



PROCESS FLOW DIAGRAM

WASTEWATER TREATMENT PLANT


Radio Towers
Limestone
LANDING STRIP
WATERFORD
Cem.
Spring
Spring
BM 256
BM 259
BM 540
Outfall 001
Orchard
Spring
Union Cem
Hospital
Town
LEESBURG
Lookout Tower
National Childrens Rehabilitation Center
Branch
Copse
DELORME
© 2002 DeLorme. 3-D TopoQuads ®. Data copyright of content owner.
www.delorme.com
Scale 1 : 25,000
1" = 2080 ft
TN
MN
10.3°W

MEMORANDUM

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

NORTHERN REGIONAL OFFICE

13901 Crown Court Woodbridge, VA 22193

SUBJECT: North Spring Behavioral Healthcare WWTP

TO: File

FROM: Susan Mackert

DATE: December 2, 2009

COPIES:

A site visit was performed on November 17, 2009 to verify information provided in the facility's permit reapplication package. Information provided in the reapplication package was found to be accurate and representative of actual site conditions.

North Spring Behavioral Healthcare is a 77-bed residential treatment facility serving adolescents. The facility's WWTP is currently permitted at 0.01 MGD. With this reissuance, the WWTP will be re-rated to 0.016 MGD. The plant receives domestic and commercial/industrial wastewater from the North Spring Behavioral Healthcare facility.

Flow is conveyed from the facility to the WWTP (photo 1) via gravity sewer and two pump stations. The North Spring Behavioral Health Center WWTP process consists of a 4,400 gallon grease trap followed by 4,200 gallon flow equalization (EQ) basin. Submersible, constant-speed influent pumps within the EQ basin discharge to a flow splitter box. The flow splitter box utilizes v-notch and rectangular weirs to discharge a fixed portion of the influent flow to two 4,400 gallon aeration tanks (in series) while the remainder of influent flow is returned to the EQ basin. Flow is then routed to a single clarifier furnished with sludge pumps and air-lift scum skimmer followed by chlorination using sodium hypochlorite and tablet dechlorination.

The North Spring Behavioral Health Center WWTP utilizes aerobic digestion. The facility has two sludge holding tanks of 1,900 gallons and 4,500 gallons, respectively. Digested sludge is then pumped and hauled by A&M Septic of Summerduck, VA (License #2705096806) to the Broad Run WRF (VA0091383) for additional treatment.

Discharge via Outfall 001 (photo 2) is to an unnamed tributary of Limestone Branch (photos 3 and 4).

Photo 1. North Spring Behavioral Healthcare WWTP.

Photo 2. Outfall 001.

Photo 3. Looking downstream from Outfall 001. The arrow points to where the discharge from the WWTP enters the UT to Limestone Branch.

Photo 4. Looking upstream from Outfall 001.

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: North Spring Behavioral Healthcare WWTP Permit No.: VA0067938

Receiving Stream: Limestone Branch, UT

Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information

Mean Hardness (as CaCO3) =	mg/L
90% Temperature (Annual) =	deg C
90% Temperature (Wet season) =	deg C
90% Maximum pH =	SU
10% Maximum pH =	SU
Tier Designation (1 or 2) =	1
Public Water Supply (PWS) Y/N? =	y
Trout Present Y/N? =	n
Early Life Stages Present Y/N? =	y

Stream Flows

1Q10 (Annual) =	0 MGD
7Q10 (Annual) =	0 MGD
30Q10 (Annual) =	0 MGD
1Q10 (Wet season) =	0 MGD
30Q10 (Wet season)	0 MGD
30Q5 =	0 MGD
Harmonic Mean =	0 MGD

Mixing Information

Annual - 1Q10 Mix =	100 %
- 7Q10 Mix =	100 %
- 30Q10 Mix =	100 %
Wet Season - 1Q10 Mix =	100 %
- 30Q10 Mix =	100 %

Effluent Information

Mean Hardness (as CaCO3) =	50 mg/L
90% Temp (Annual) =	25 deg C
90% Temp (Wet season) =	deg C
90% Maximum pH =	8.4 SU
10% Maximum pH =	SU
Discharge Flow =	0.016 MGD

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				**Most Limiting Allocations**			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Acenapthene	0	--	--	6.7E+02	9.9E+02	--	--	6.7E+02	9.9E+02	--	--	--	--	--	--	--	--	--	--	**6.7E+02**	**9.9E+02**
Acrolein	0	--	--	6.1E+00	9.3E+00	--	--	6.1E+00	9.3E+00	--	--	--	--	--	--	--	--	--	--	**6.1E+00**	**9.3E+00**
Acrylonitrile [C]	0	--	--	5.1E-01	2.5E+00	--	--	5.1E-01	2.5E+00	--	--	--	--	--	--	--	--	--	--	**5.1E-01**	**2.5E+00**
Aldrin [C]	0	3.0E+00	--	4.9E-04	5.0E-04	3.0E+00	--	4.9E-04	5.0E-04	--	--	--	--	--	--	--	--	**3.0E+00**	--	**4.9E-04**	**5.0E-04**
Ammonia-N (mg/l) (Yearly)	0	3.88E+00	6.56E-01	--	--	3.9E+00	6.6E-01	--	--	--	--	--	--	--	--	--	--	**3.9E+00**	**6.6E-01**	--	--
Ammonia-N (mg/l) (High Flow)	0	3.88E+00	1.29E+00	--	--	3.9E+00	1.3E+00	--	--	--	--	--	--	--	--	--	--	**3.9E+00**	**1.3E+00**	--	--
Anthracene	0	--	--	8.3E+03	4.0E+04	--	--	8.3E+03	4.0E+04	--	--	--	--	--	--	--	--	--	--	**8.3E+03**	**4.0E+04**
Antimony	0	--	--	5.6E+00	6.4E+02	--	--	5.6E+00	6.4E+02	--	--	--	--	--	--	--	--	--	--	**5.6E+00**	**6.4E+02**
Arsenic	0	3.4E+02	1.5E+02	1.0E+01	--	3.4E+02	1.5E+02	1.0E+01	--	--	--	--	--	--	--	--	--	**3.4E+02**	**1.5E+02**	**1.0E+01**	--
Barium	0	--	--	2.0E+03	--	--	--	2.0E+03	--	--	--	--	--	--	--	--	--	--	--	**2.0E+03**	--
Benzene [C]	0	--	--	2.2E+01	5.1E+02	--	--	2.2E+01	5.1E+02	--	--	--	--	--	--	--	--	--	--	**2.2E+01**	**5.1E+02**
Benzidine [C]	0	--	--	8.6E-04	2.0E-03	--	--	8.6E-04	2.0E-03	--	--	--	--	--	--	--	--	--	--	**8.6E-04**	**2.0E-03**
Benzo (a) anthracene [C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	**3.8E-02**	**1.8E-01**
Benzo (b) fluoranthene [C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	**3.8E-02**	**1.8E-01**
Benzo (k) fluoranthene [C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	**3.8E-02**	**1.8E-01**
Benzo (a) pyrene [C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	**3.8E-02**	**1.8E-01**
Bis2-Chloroethyl Ether [C]	0	--	--	3.0E-01	5.3E+00	--	--	3.0E-01	5.3E+00	--	--	--	--	--	--	--	--	--	--	**3.0E-01**	**5.3E+00**
Bis2-Chloroisopropyl Ether	0	--	--	1.4E+03	6.5E+04	--	--	1.4E+03	6.5E+04	--	--	--	--	--	--	--	--	--	--	**1.4E+03**	**6.5E+04**
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	1.2E+01	2.2E+01	--	--	1.2E+01	2.2E+01	--	--	--	--	--	--	--	--	--	--	**1.2E+01**	**2.2E+01**
Bromoform [C]	0	--	--	4.3E+01	1.4E+03	--	--	4.3E+01	1.4E+03	--	--	--	--	--	--	--	--	--	--	**4.3E+01**	**1.4E+03**
Butylbenzylphthalate	0	--	--	1.5E+03	1.9E+03	--	--	1.5E+03	1.9E+03	--	--	--	--	--	--	--	--	--	--	**1.5E+03**	**1.9E+03**
Cadmium	0	1.8E+00	6.6E-01	5.0E+00	--	1.8E+00	6.6E-01	5.0E+00	--	--	--	--	--	--	--	--	--	**1.8E+00**	**6.6E-01**	**5.0E+00**	--
Carbon Tetrachloride [C]	0	--	--	2.3E+00	1.6E+01	--	--	2.3E+00	1.6E+01	--	--	--	--	--	--	--	--	--	--	**2.3E+00**	**1.6E+01**
Chlordane [C]	0	2.4E+00	4.3E-03	8.0E-03	8.1E-03	2.4E+00	4.3E-03	8.0E-03	8.1E-03	--	--	--	--	--	--	--	--	**2.4E+00**	**4.3E-03**	**8.0E-03**	**8.1E-03**
Chloride	0	8.6E+05	2.3E+05	2.5E+05	--	8.6E+05	2.3E+05	2.5E+05	--	--	--	--	--	--	--	--	--	**8.6E+05**	**2.3E+05**	**2.5E+05**	--
TRC	0	1.9E+01	1.1E+01	--	--	1.9E+01	1.1E+01	--	--	--	--	--	--	--	--	--	--	**1.9E+01**	**1.1E+01**	--	--
Chlorobenzene	0	--	--	1.3E+02	1.6E+03	--	--	1.3E+02	1.6E+03	--	--	--	--	--	--	--	--	--	--	**1.3E+02**	**1.6E+03**

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	4.0E+00	1.3E+02	--	--	4.0E+00	1.3E+02	--	--	--	--	--	--	--	--	--	--	4.0E+00	1.3E+02
Chloroform	0	--	--	3.4E+02	1.1E+04	--	--	3.4E+02	1.1E+04	--	--	--	--	--	--	--	--	--	--	3.4E+02	1.1E+04
2-Chloronaphthalene	0	--	--	1.0E+03	1.6E+03	--	--	1.0E+03	1.6E+03	--	--	--	--	--	--	--	--	--	--	1.0E+03	1.6E+03
2-Chlorophenol	0	--	--	8.1E+01	1.5E+02	--	--	8.1E+01	1.5E+02	--	--	--	--	--	--	--	--	--	--	8.1E+01	1.5E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	--	--	8.3E-02	4.1E-02	--	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	--	--
Chromium III	0	3.2E+02	4.2E+01	--	--	3.2E+02	4.2E+01	--	--	--	--	--	--	--	--	--	--	3.2E+02	4.2E+01	--	--
Chromium VI	0	1.6E+01	1.1E+01	--	--	1.6E+01	1.1E+01	--	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	--	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	--
Chrysene[C]	0	--	--	3.8E-03	1.8E-02	--	--	3.8E-03	1.8E-02	--	--	--	--	--	--	--	--	--	--	3.8E-03	1.8E-02
Copper	0	7.0E+00	5.0E+00	1.3E+03	--	7.0E+00	5.0E+00	1.3E+03	--	--	--	--	--	--	--	--	--	7.0E+00	5.0E+00	1.3E+03	--
Cyanide, Free	0	2.2E+01	5.2E+00	1.4E+02	1.6E+04	2.2E+01	5.2E+00	1.4E+02	1.6E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	1.4E+02	1.6E+04
DDD[C]	0	--	--	3.1E-03	3.1E-03	--	--	3.1E-03	3.1E-03	--	--	--	--	--	--	--	--	--	--	3.1E-03	3.1E-03
DDE[C]	0	--	--	2.2E-03	2.2E-03	--	--	2.2E-03	2.2E-03	--	--	--	--	--	--	--	--	--	--	2.2E-03	2.2E-03
DDT[C]	0	1.1E+00	1.0E-03	2.2E-03	2.2E-03	1.1E+00	1.0E-03	2.2E-03	2.2E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	2.2E-03	2.2E-03
Demeton	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	--	--	--	--	--	--	--	--	1.0E-01	--	--
Diazinon	0	1.7E-01	1.7E-01	--	--	1.7E-01	1.7E-01	--	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	--	--
Dibenz(a,h)anthracene[C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	3.8E-02	1.8E-01
1,2-Dichlorobenzene	0	--	--	4.2E+02	1.3E+03	--	--	4.2E+02	1.3E+03	--	--	--	--	--	--	--	--	--	--	4.2E+02	1.3E+03
1,3-Dichlorobenzene	0	--	--	3.2E+02	9.6E+02	--	--	3.2E+02	9.6E+02	--	--	--	--	--	--	--	--	--	--	3.2E+02	9.6E+02
1,4-Dichlorobenzene	0	--	--	6.3E+01	1.9E+02	--	--	6.3E+01	1.9E+02	--	--	--	--	--	--	--	--	--	--	6.3E+01	1.9E+02
3,3-Dichlorobenzidine[C]	0	--	--	2.1E-01	2.8E-01	--	--	2.1E-01	2.8E-01	--	--	--	--	--	--	--	--	--	--	2.1E-01	2.8E-01
Dichlorobromomethane[C]	0	--	--	5.5E+00	1.7E+02	--	--	5.5E+00	1.7E+02	--	--	--	--	--	--	--	--	--	--	5.5E+00	1.7E+02
1,2-Dichloroethane[C]	0	--	--	3.8E+00	3.7E+02	--	--	3.8E+00	3.7E+02	--	--	--	--	--	--	--	--	--	--	3.8E+00	3.7E+02
1,1-Dichloroethylene	0	--	--	3.3E+02	7.1E+03	--	--	3.3E+02	7.1E+03	--	--	--	--	--	--	--	--	--	--	3.3E+02	7.1E+03
1,2-trans-dichloroethylene	0	--	--	1.4E+02	1.0E+04	--	--	1.4E+02	1.0E+04	--	--	--	--	--	--	--	--	--	--	1.4E+02	1.0E+04
2,4-Dichlorophenol	0	--	--	7.7E+01	2.9E+02	--	--	7.7E+01	2.9E+02	--	--	--	--	--	--	--	--	--	--	7.7E+01	2.9E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	1.0E+02	--	--	--	1.0E+02	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	--
1,2-Dichloropropane[C]	0	--	--	5.0E+00	1.5E+02	--	--	5.0E+00	1.5E+02	--	--	--	--	--	--	--	--	--	--	5.0E+00	1.5E+02
1,3-Dichloropropene[C]	0	--	--	3.4E+00	2.1E+02	--	--	3.4E+00	2.1E+02	--	--	--	--	--	--	--	--	--	--	3.4E+00	2.1E+02
Dieldrin[C]	0	2.4E-01	5.6E-02	5.2E-04	5.4E-04	2.4E-01	5.6E-02	5.2E-04	5.4E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	5.2E-04	5.4E-04
Diethyl Phthalate	0	--	--	1.7E+04	4.4E+04	--	--	1.7E+04	4.4E+04	--	--	--	--	--	--	--	--	--	--	1.7E+04	4.4E+04
2,4-Dimethylphenol	0	--	--	3.8E+02	8.5E+02	--	--	3.8E+02	8.5E+02	--	--	--	--	--	--	--	--	--	--	3.8E+02	8.5E+02
Dimethyl Phthalate	0	--	--	2.7E+05	1.1E+06	--	--	2.7E+05	1.1E+06	--	--	--	--	--	--	--	--	--	--	2.7E+05	1.1E+06
Di-n-Butyl Phthalate	0	--	--	2.0E+03	4.5E+03	--	--	2.0E+03	4.5E+03	--	--	--	--	--	--	--	--	--	--	2.0E+03	4.5E+03
2,4 Dinitrophenol	0	--	--	6.9E+01	5.3E+03	--	--	6.9E+01	5.3E+03	--	--	--	--	--	--	--	--	--	--	6.9E+01	5.3E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	1.3E+01	2.8E+02	--	--	1.3E+01	2.8E+02	--	--	--	--	--	--	--	--	--	--	1.3E+01	2.8E+02
2,4-Dinitrotoluene[C]	0	--	--	1.1E+00	3.4E+01	--	--	1.1E+00	3.4E+01	--	--	--	--	--	--	--	--	--	--	1.1E+00	3.4E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	5.0E-08	5.1E-08	--	--	5.0E-08	5.1E-08	--	--	--	--	--	--	--	--	--	--	5.0E-08	5.1E-08
1,2-Diphenylhydrazine[C]	0	--	--	3.6E-01	2.0E+00	--	--	3.6E-01	2.0E+00	--	--	--	--	--	--	--	--	--	--	3.6E-01	2.0E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	6.2E+01	8.9E+01	2.2E-01	5.6E-02	6.2E+01	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	6.2E+01	8.9E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	6.2E+01	8.9E+01	2.2E-01	5.6E-02	6.2E+01	8.9E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	6.2E+01	8.9E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	6.2E+01	8.9E+01	--	--	6.2E+01	8.9E+01	--	--	--	--	--	--	--	--	--	--	6.2E+01	8.9E+01
Endrin	0	8.6E-02	3.6E-02	5.9E-02	6.0E-02	8.6E-02	3.6E-02	5.9E-02	6.0E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	5.9E-02	6.0E-02
Endrin Aldehyde	0	--	--	2.9E-01	3.0E-01	--	--	2.9E-01	3.0E-01	--	--	--	--	--	--	--	--	--	--	2.9E-01	3.0E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	5.3E+02	2.1E+03	--	--	5.3E+02	2.1E+03	--	--	--	--	--	--	--	--	--	--	5.3E+02	2.1E+03
Fluoranthene	0	--	--	1.3E+02	1.4E+02	--	--	1.3E+02	1.4E+02	--	--	--	--	--	--	--	--	--	--	1.3E+02	1.4E+02
Fluorene	0	--	--	1.1E+03	5.3E+03	--	--	1.1E+03	5.3E+03	--	--	--	--	--	--	--	--	--	--	1.1E+03	5.3E+03
Foaming Agents	0	--	--	5.0E+02	--	--	--	5.0E+02	--	--	--	--	--	--	--	--	--	--	--	5.0E+02	--
Guthion	0	--	1.0E-02	--	--	--	1.0E-02	--	--	--	--	--	--	--	--	--	--	--	1.0E-02	--	--
Heptachlor [C]	0	5.2E-01	3.8E-03	7.9E-04	7.9E-04	5.2E-01	3.8E-03	7.9E-04	7.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	7.9E-04	7.9E-04
Heptachlor Epoxide [C]	0	5.2E-01	3.8E-03	3.9E-04	3.9E-04	5.2E-01	3.8E-03	3.9E-04	3.9E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	3.9E-04	3.9E-04
Hexachlorobenzene [C]	0	--	--	2.8E-03	2.9E-03	--	--	2.8E-03	2.9E-03	--	--	--	--	--	--	--	--	--	--	2.8E-03	2.9E-03
Hexachlorobutadiene [C]	0	--	--	4.4E+00	1.8E+02	--	--	4.4E+00	1.8E+02	--	--	--	--	--	--	--	--	--	--	4.4E+00	1.8E+02
Hexachlorocyclohexane Alpha-BHC [C]	0	--	--	2.6E-02	4.9E-02	--	--	2.6E-02	4.9E-02	--	--	--	--	--	--	--	--	--	--	2.6E-02	4.9E-02
Hexachlorocyclohexane Beta-BHC [C]	0	--	--	9.1E-02	1.7E-01	--	--	9.1E-02	1.7E-01	--	--	--	--	--	--	--	--	--	--	9.1E-02	1.7E-01
Hexachlorocyclohexane Gamma-BHC [C] (Lindane)	0	9.5E-01	--	9.8E-01	1.8E+00	9.5E-01	--	9.8E-01	1.8E+00	--	--	--	--	--	--	--	--	9.5E-01	--	9.8E-01	1.8E+00
Hexachlorocyclopentadiene	0	--	--	4.0E+01	1.1E+03	--	--	4.0E+01	1.1E+03	--	--	--	--	--	--	--	--	--	--	4.0E+01	1.1E+03
Hexachloroethane [C]	0	--	--	1.4E+01	3.3E+01	--	--	1.4E+01	3.3E+01	--	--	--	--	--	--	--	--	--	--	1.4E+01	3.3E+01
Hydrogen Sulfide	0	--	2.0E+00	--	--	--	2.0E+00	--	--	--	--	--	--	--	--	--	--	--	2.0E+00	--	--
Indeno (1,2,3-cd) pyrene [C]	0	--	--	3.8E-02	1.8E-01	--	--	3.8E-02	1.8E-01	--	--	--	--	--	--	--	--	--	--	3.8E-02	1.8E-01
Iron	0	--	--	3.0E+02	--	--	--	3.0E+02	--	--	--	--	--	--	--	--	--	--	--	3.0E+02	--
Isophorone [C]	0	--	--	3.5E+02	9.6E+03	--	--	3.5E+02	9.6E+03	--	--	--	--	--	--	--	--	--	--	3.5E+02	9.6E+03
Kepone	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	--	--	--	--	--	--	--	--	0.0E+00	--	--
Lead	0	4.9E+01	5.6E+00	1.5E+01	--	4.9E+01	5.6E+00	1.5E+01	--	--	--	--	--	--	--	--	--	4.9E+01	5.6E+00	1.5E+01	--
Malathion	0	--	1.0E-01	--	--	--	1.0E-01	--	--	--	--	--	--	--	--	--	--	--	1.0E-01	--	--
Manganese	0	--	--	5.0E+01	--	--	--	5.0E+01	--	--	--	--	--	--	--	--	--	--	--	5.0E+01	--
Mercury	0	1.4E+00	7.7E-01	- -	- -	1.4E+00	7.7E-01	- -	- -	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	- -	- -
Methyl Bromide	0	--	--	4.7E+01	1.5E+03	--	--	4.7E+01	1.5E+03	--	--	--	--	--	--	--	--	--	--	4.7E+01	1.5E+03
Methylene Chloride [C]	0	--	--	4.6E+01	5.9E+03	--	--	4.6E+01	5.9E+03	--	--	--	--	--	--	--	--	--	--	4.6E+01	5.9E+03
Methoxychlor	0	--	3.0E-02	1.0E+02	--	--	3.0E-02	1.0E+02	--	--	--	--	--	--	--	--	--	--	3.0E-02	1.0E+02	--
Mirex	0	--	0.0E+00	--	--	--	0.0E+00	--	--	--	--	--	--	--	--	--	--	--	0.0E+00	--	--
Nickel	0	1.0E+02	1.1E+01	6.1E+02	4.6E+03	1.0E+02	1.1E+01	6.1E+02	4.6E+03	--	--	--	--	--	--	--	--	1.0E+02	1.1E+01	6.1E+02	4.6E+03
Nitrate (as N)	0	--	--	1.0E+04	--	--	--	1.0E+04	--	--	--	--	--	--	--	--	--	--	--	1.0E+04	--
Nitrobenzene	0	--	--	1.7E+01	6.9E+02	--	--	1.7E+01	6.9E+02	--	--	--	--	--	--	--	--	--	--	1.7E+01	6.9E+02
N-Nitrosodimethylamine [C]	0	--	--	6.9E-03	3.0E+01	--	--	6.9E-03	3.0E+01	--	--	--	--	--	--	--	--	--	--	6.9E-03	3.0E+01
N-Nitrosodiphenylamine [C]	0	--	--	3.3E+01	6.0E+01	--	--	3.3E+01	6.0E+01	--	--	--	--	--	--	--	--	--	--	3.3E+01	6.0E+01
N-Nitrosodi-n-propylamine [C]	0	--	--	5.0E-02	5.1E+00	--	--	5.0E-02	5.1E+00	--	--	--	--	--	--	--	--	--	--	5.0E-02	5.1E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	--	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	--	--
Parathion	0	6.5E-02	1.3E-02	--	--	6.5E-02	1.3E-02	--	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	--	--
PCB Total [C]	0	--	1.4E-02	6.4E-04	6.4E-04	--	1.4E-02	6.4E-04	6.4E-04	--	--	--	--	--	--	--	--	--	1.4E-02	6.4E-04	6.4E-04
Pentachlorophenol [C]	0	7.7E-03	5.9E-03	2.7E+00	3.0E+01	7.7E-03	5.9E-03	2.7E+00	3.0E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	2.7E+00	3.0E+01
Phenol	0	--	--	1.0E+04	8.6E+05	--	--	1.0E+04	8.6E+05	--	--	--	--	--	--	--	--	--	--	1.0E+04	8.6E+05
Pyrene	0	--	--	8.3E+02	4.0E+03	--	--	8.3E+02	4.0E+03	--	--	--	--	--	--	--	--	--	--	8.3E+02	4.0E+03
Radionuclides	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Gross Alpha Activity (pCi/L)	0	--	--	1.5E+01	--	--	--	1.5E+01	--	--	--	--	--	--	--	--	--	--	--	1.5E+01	--
Beta and Photon Activity (mrem/yr)	0	--	--	4.0E+00	4.0E+00	--	--	4.0E+00	4.0E+00	--	--	--	--	--	--	--	--	--	--	4.0E+00	4.0E+00
Radium 226 + 228 (pCi/L)	0	--	--	5.0E+00	--	--	--	5.0E+00	--	--	--	--	--	--	--	--	--	--	--	5.0E+00	--
Uranium (ug/l)	0	--	--	3.0E+01	--	--	--	3.0E+01	--	--	--	--	--	--	--	--	--	--	--	3.0E+01	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	**Acute**	**Chronic**	**HH (PWS)**	**HH**
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	1.7E+02	4.2E+03	2.0E+01	5.0E+00	1.7E+02	4.2E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**1.7E+02**	**4.2E+03**
Silver	0	1.0E+00	--	--	--	1.0E+00	--	--	--	--	--	--	--	--	--	--	--	**1.0E+00**	**--**	**--**	**--**
Sulfate	0	--	--	2.5E+05	--	--	--	2.5E+05	--	--	--	--	--	--	--	--	--	**--**	**--**	**2.5E+05**	**--**
1,1,2,2-Tetrachloroethane[C]	0	--	--	1.7E+00	4.0E+01	--	--	1.7E+00	4.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**1.7E+00**	**4.0E+01**
Tetrachloroethylene[C]	0	--	--	6.9E+00	3.3E+01	--	--	6.9E+00	3.3E+01	--	--	--	--	--	--	--	--	**--**	**--**	**6.9E+00**	**3.3E+01**
Thallium	0	--	--	2.4E-01	4.7E-01	--	--	2.4E-01	4.7E-01	--	--	--	--	--	--	--	--	**--**	**--**	**2.4E-01**	**4.7E-01**
Toluene	0	--	--	5.1E+02	6.0E+03	--	--	5.1E+02	6.0E+03	--	--	--	--	--	--	--	--	**--**	**--**	**5.1E+02**	**6.0E+03**
Total dissolved solids	0	--	--	5.0E+05	--	--	--	5.0E+05	--	--	--	--	--	--	--	--	--	**--**	**--**	**5.0E+05**	**--**
Toxaphene [C]	0	7.3E-01	2.0E-04	2.8E-03	2.8E-03	7.3E-01	2.0E-04	2.8E-03	2.8E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**2.8E-03**	**2.8E-03**
Tributyltin	0	4.6E-01	7.2E-02	--	--	4.6E-01	7.2E-02	--	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**--**	**--**
1,2,4-Trichlorobenzene	0	--	--	3.5E+01	7.0E+01	--	--	3.5E+01	7.0E+01	--	--	--	--	--	--	--	--	**--**	**--**	**3.5E+01**	**7.0E+01**
1,1,2-Trichloroethane[C]	0	--	--	5.9E+00	1.6E+02	--	--	5.9E+00	1.6E+02	--	--	--	--	--	--	--	--	**--**	**--**	**5.9E+00**	**1.6E+02**
Trichloroethylene [C]	0	--	--	2.5E+01	3.0E+02	--	--	2.5E+01	3.0E+02	--	--	--	--	--	--	--	--	**--**	**--**	**2.5E+01**	**3.0E+02**
2,4,6-Trichlorophenol [C]	0	--	--	1.4E+01	2.4E+01	--	--	1.4E+01	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**1.4E+01**	**2.4E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	5.0E+01	--	--	--	5.0E+01	--	--	--	--	--	--	--	--	--	**--**	**--**	**5.0E+01**	**--**
Vinyl Chloride[C]	0	--	--	2.5E-01	2.4E+01	--	--	2.5E-01	2.4E+01	--	--	--	--	--	--	--	--	**--**	**--**	**2.5E-01**	**2.4E+01**
Zinc	0	6.5E+01	6.6E+01	7.4E+03	2.6E+04	6.5E+01	6.6E+01	7.4E+03	2.6E+04	--	--	--	--	--	--	--	--	**6.5E+01**	**6.6E+01**	**7.4E+03**	**2.6E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	5.6E+00
Arsenic	1.0E+01
Barium	2.0E+03
Cadmium	3.9E-01
Chromium III	2.5E+01
Chromium VI	6.4E+00
Copper	2.8E+00
Iron	3.0E+02
Lead	3.4E+00
Manganese	5.0E+01
Mercury	4.6E-01
Nickel	6.8E+00
Selenium	3.0E+00
Silver	4.2E-01
Zinc	2.6E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

3/15/2010 10:23:48 AM

Facility = North Spring Behavioral Healthcare WWTP
Chemical = Chlorine
Chronic averaging period = 30
WLAa = 0.019 mg/l
WLAc = 0.011 mg/l
Q.L. = 0.1
# samples/mo. = 28
# samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = .2
Variance = .0144
C.V. = 0.6
97th percentile daily values = .486683
97th percentile 4 day average = .332758
97th percentile 30 day average= .241210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Acute Toxicity
Maximum Daily Limit = 0.019
Average Weekly limit = 1.16034369282885E-02
Average Monthly LImit = 9.47327018453872E-03

The data are:

0.2

3/15/2010 10:23:06 AM

Facility = North Spring Behavioral Healthcare WWTP
Chemical = Ammonia
Chronic averaging period = 30
WLAa = 3.9 mg/l
WLAc = 0.66 mg/l
Q.L. = 0.2
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 1.33166226165477
Average Weekly limit = 1.33166226165477
Average Monthly LImit = 1.33166226165477

The data are:

9

Subject: Loudoun County - Springwood Institute at Leesburg
NPDES VA0067938

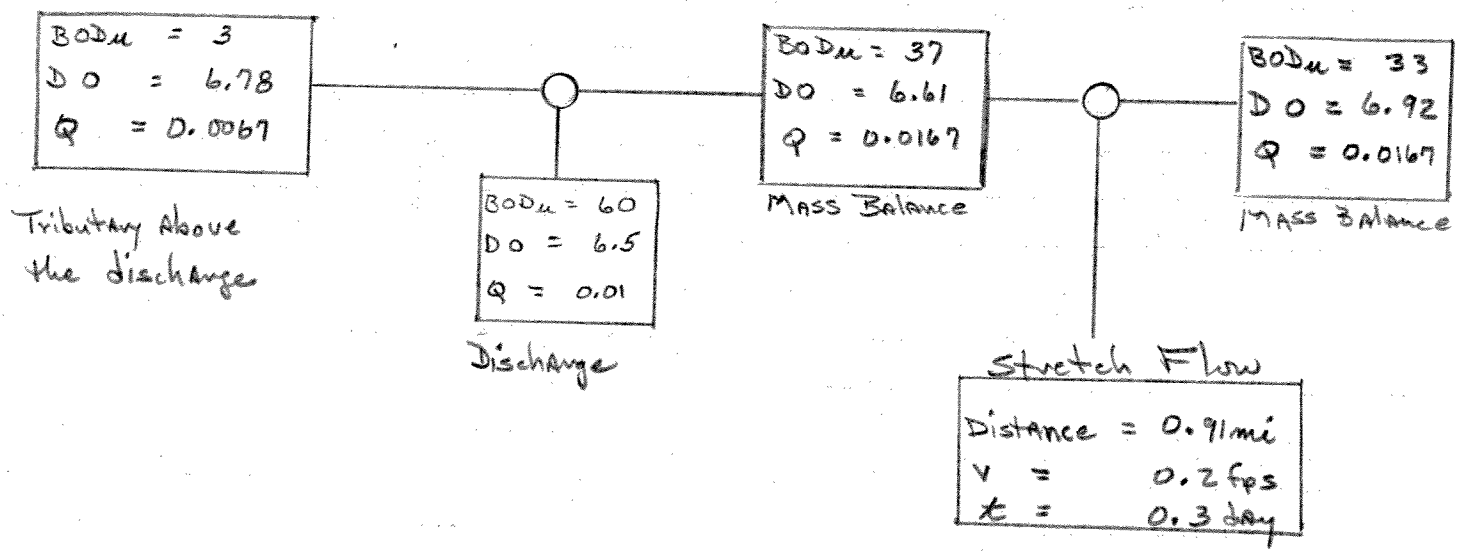
To: Dale Phillips, BWCM
From: John Hopkins, NRO
Date: December 16, 1983

This memo transmits a flow diagram and general information about a stream model run for the above mentioned discharge. Any comments you have would be appreciated.

1. Size of proposed discharge 0.01 mgd
2. Critical discharge - USGS gauge at Goose Creek near Middleburg - 0.34 cfs 0.0028 cfs/mi^2
3. Drainage area above point of discharge 3.71 mi^2
4. Slope from discharge to Limestone Branch $\frac{250-225}{1 \text{ mile}}$ = 0.0047 ft/ft
5. $BOD_u = 30D_5 \times 2$
6. D.O. saturation at elevation $7.6\left[1-(0.00003(250))\right] = 7.543$
7. $K_{2(20)} = 0.025\left(\frac{\Delta H}{L}\right)(24) = 0.025\left(\frac{25}{1}\right)(24) = 15$ /day
8. $K_{2(20)} = 15$; $K_{2(30)} = 19$ day^{-1}
9. $K_{1(20)} = 0.218$ $K_{1(30)} = 0.34$ day^{-1}

A D.O. sag existed in the model but was satisfied within 0.01 day of the discharge point.

Appropriate limits for this discharge appear to be BOD_5 and suspended solids of 30 mg/l each and a D.O. of 6.5 mg/l.



Discharge is in Loudoun County on the west side of Route 15 Approximately 2000 feet north of the intersection with the Route 15 By-Pass at Leesburg. It is to a tributary 4800 feet from Limestone Branch, 600 feet north of Rt 655 and 250 feet west of Rt. 15.

MEMORANDUM

VIRGINIA WATER CONTROL BOARD
NORTHERN REGIONAL OFFICE

5515 Cherokee Avenue, Suite 404 Alexandria, Virginia 22312

Due 6/20/88

Burt Tuxford OWRM

SUBJECT: Loudoun County: Springwood Psychiatric Institute WWTP, NPDES Permit No. VA0067938, Request Permit Modification for Increase in Design Flow

TO: Martin Ferguson, OWRM

FROM: Joan C. Foundos, NRO JCFoundos

DATE: June 7, 1988

COPIES: Burt Tuxford, File

By letter dated April 29, 1988, the consultants for Springwood Psychiatric Institute requested an increase in design flow for the wastewater treatment plant. They have requested to increase the design flow from 0.01 MGD to 0.025 MGD. This facility discharges into Limestone Branch.

A file search revealed a stream model dated December 16, 1983 for this facility. This model established a BOD_5 effluent limit of 30 mg/l and a DO effluent limit of 6.5 mg/l with a design flow of 0.01 MGD. This model was recreated and is attached for your reference. The same assumptions, drainage area, stream velocities, and K rates used in the 1983 were used in the 1988 model. Since this is a request for an increase in design flow, TKN effluent limit was included in my model. There is no effluent data to review to see if this facility is nitrifying.

The stream model was run using the following effluent limits:

$CBOD_5$	15 mg/l
TKN	5 mg/l (April 1 - Oct. 31)
DO	6.5 mg/l
design flow	0.025 MGD

Δ DO for this run was 0.307 mg/l. Sensitivity runs for these effluent limits revealed Δ DOs as follows:

1/2 K_2	Δ DO 0.335 mg/l
double K_1	Δ DO 0.307 mg/l
double K_n	Δ DO 0.307 mg/l

It is felt that these Δ DOs are acceptable and if the above effluent limits are maintained by the facility water quality standards will be met in the receiving stream.

CALCULATION FOR SPRINGWOOD

1983 MODEL

flow 0.01 MGD
BOD_5 30 mg/l
DO 6.5 mg/l

1988 MODEL

flow 0.025 MGD
$CBOD_5$ 15 mg/l
TKN 5 mg/l
DO 6.5 mg/l

BACKGROUND DATA

BOD_u = 1.5 x 2 = 30 mg/l
DO = 6.89 mg/l
Q = 0.0067 MGD

SECTION 1:

BOD_5 30 x 2 = 60 mg/l
DO = 6.5 mg/l
flow = 0.01 MGD
K_1 = .218

distance 0.91 miles
velocity 0.2 cfs
K_2 = 15
elevation 237
K_n = 0.3

$CBOD_5$ 15 x 2 = 30 mg/l
TKN (5 - 3) 4.33 = 8.66
DO = 6.5 mg/l
K_1 = .168

MODEL SIMULATION FOR THE
SPRINGWOOD PSYCHIATRIC INSTITUTE WASTEWATER TREATMENT PLANT DISCHARGE TO LIMESTONE BRANCH

THE BACKGROUND CONDITIONS ARE:

FLOW= 0.0067 MGD D.O.= 6.890 MG/L CBODu= 3.00 MG/L NBODu= 0.00 MG/L

OUTPUT WILL BE GENERATED EVERY 0.10 MILE FROM THE BEGINNING OF A SEGMENT

THE VARIABLES FOR SECTION 1 ARE:

SEGMENT LENGTH = [illegible] MI VELOCITY = 1.73 M/D
[illegible] = [illegible] AREA = [illegible] FT REAERATION COEF. = .156 MG/L
K1 = [illegible] K3 = 2.8 /DAY K4 = 0.500 /DAY

The K rates shown are at 20 degrees C. The model corrects them.

FOR THE DISCHARGE AT THE BEGINNING OF THE SEGMENT:

FLOW= 0.0100 MGD D.O.= 6.50 MG/L CBODu= 60.00 MG/L NBODu= 0.00 MG/L

THE RESULTS FOR SECTION 1 ARE:

DISTANCE (MI) FROM HEAD OF SEGMENT	TOTAL DISTANCE (MILES FROM M	D.O. (MG/L)	CBODu (MG/L)	NBODu (MG/L)
0.000	0.000	6.657	57.142	0.000
0.100	0.100	6.642	56.742	0.000
0.200	0.200	6.626	56.357	0.000
0.300	0.300	6.610	55.976	0.000
0.400	0.400	6.597	55.598	0.000
0.500	0.500	6.588	55.223	0.000
0.600	0.600	7.032	54.855	0.000
0.700	0.700	7.013	54.490	0.000
0.800	0.800	7.022	54.128	0.000
0.900	0.900	7.030	53.770	0.000
1.000	0.900	7.036	53.414	0.000

SIMULATION COMPLETED

09/08/1988 10:43:18

rerun of Springwood
design flow .01 mgd
BOD_5 30
DO 6.5

6.89
6.657
ADD .133

MODEL SIMULATION FOR THE
SPRINGWOOD PSYCHIATRIC INSTITUTE WASTEWATER TREATMENT PLANT DISCHARGE TO LIMESTONE BRANCH

THE BACKGROUND CONDITIONS ARE:

FLOW= 0.0067 MGD D.O.= 6.890 MG/L CBODu= 3.00 MG/L NBODu= 0.00 MG/L

OUTPUT WILL BE GENERATED EVERY 0.10 MILE FROM THE BEGINNING OF A SEGMENT

THE VARIABLES FOR SECTION 1 ARE:

SEGMENT LENGTH = 0.91 MI VELOCITY = 3.273 MI/D
TEMP. = 30.0 xC ELEV = 237.00 FT SATURATION D.O. = 7.656 MG/L
Ka = 15.000 /DAY Kr = 0.168 /DAY Kn = 0.300 /DAY

The k rates shown are at 20 degrees C. The model corrects them.

FOR THE DISCHARGE AT THE BEGINNING OF THE SEGMENT:

FLOW= 0.0250 MGD D.O.= 6.50 MG/L CBODu= 30.00 MG/L NBODu= 8.66 MG/L

THE RESULTS FOR SECTION 1 ARE:

DISTANCE (MI) FROM HEAD OF SEGMENT	TOTAL DISTANCE (MI) FROM BEGINNING	D.O. (mg/l)	CBODu (mg/l)	NBODu (mg/l)
0.000	0.000	6.583	24.293	6.830
0.100	0.100	6.805	24.097	6.696
0.200	0.200	6.933	23.902	6.565
0.300	0.300	7.007	23.708	6.436
0.400	0.400	7.052	23.516	6.310
0.500	0.500	7.080	23.326	6.186
0.600	0.600	7.099	23.137	6.065
0.700	0.700	7.112	22.950	5.946
0.800	0.800	7.123	22.764	5.830
0.900	0.900	7.132	22.580	5.715
0.910	0.910	7.132	22.562	5.704

SIMULATION COMPLETED

06-03-1988 07:15:12

CBOD5 15
TKN 5
Flow .025

6.89
6.583
ΔD .307

MODEL SIMULATION FOR THE
SPRINGWOOD PSYCHIATRIC INSTITUTE WASTEWATER TREATMENT PLANT DISCHARGE TO LIMESTONE BRANCH

==========

THE BACKGROUND CONDITIONS ARE:

FLOW= 0.0067 MGD D.O.= 6.890 MG/L CBODu= 3.00 MG/L NBODu= 0.00 MG/L

OUTPUT WILL BE GENERATED EVERY 0.10 MILE FROM THE BEGINNING OF A SEGMENT

****

THE VARIABLES FOR SECTION 1 ARE:

SEGMENT LENGTH = 0.91 MI VELOCITY = 3.273 MI/D
TEMP. = 30.0 xC ELEV = 237.00 FT SATURATION D.O. = 7.656 MG/L
Ka = 7.500 /DAY Kr = 0.168 /DAY Kn = 0.300 /DAY

The k rates shown are at 20 degrees C. The model corrects them.

FOR THE DISCHARGE AT THE BEGINNING OF THE SEGMENT:

FLOW= 0.0250 MGD D.O.= 6.50 MG/L CBODu= 30.00 MG/L NBODu= 8.66 MG/L

. . . . . .

THE RESULTS FOR SECTION 1 ARE:

DISTANCE (MI) FROM HEAD OF SEGMENT	TOTAL DISTANCE (MI) FROM BEGINNING	D.O. (mg/l)	CBODu (mg/l)	NBODu (mg/l)
0.000	0.000	6.583	24.293	6.830
0.100	0.100	6.566	24.097	6.696
0.200	0.200	6.558	23.902	6.565
0.300	0.300	6.555	23.708	6.436
0.400	0.400	6.557	23.516	6.310
0.500	0.500	6.562	23.326	6.186
0.600	0.600	6.569	23.137	6.065
0.700	0.700	6.577	22.950	5.946
0.800	0.800	6.587	22.764	5.830
0.900	0.900	6.598	22.580	5.715
0.910	0.910	6.599	22.562	5.704

****

SIMULATION COMPLETED

06-03-1988 09:14:59

Sensitivity Run

$\frac{1}{2} K_2$

6.89
6.555
ΔDO .335

MODEL SIMULATION FOR THE
SPRINGWOOD PSYCHIATRIC INSTITUTE WASTEWATER TREATMENT PLANT DISCHARGE TO
LIMESTONE BRANCH

Sensitivity Run
double K_1

THE BACKGROUND CONDITIONS ARE:

FLOW= 0.0067 MGD D.O.= 6.890 MG/L CBODu= 3.00 MG/L NBODu= 0.00 MG/L

OUTPUT WILL BE GENERATED EVERY 0.10 MILE FROM THE BEGINNING OF A SEGMENT

THE VARIABLES FOR SECTION 1 ARE:

SEGMENT LENGTH = 0.91 MI VELOCITY = 3.273 MI/D
TEMP. = 30.0 xC ELEV = 237.00 FT SATURATION D.O. = 7.656 MG/L
Ka = 15.000 /DAY Kr = 0.336 /DAY Kn = 0.300 /DAY

The k rates shown are at 20 degrees C. The model corrects them.

FOR THE DISCHARGE AT THE BEGINNING OF THE SEGMENT:

FLOW= 0.0250 MGD D.O.= 6.50 MG/L CBODu= 30.00 MG/L NBODu= 8.66 MG/L

6.89
6.583
ΔDO .307

THE RESULTS FOR SECTION 1 ARE:

DISTANCE (MI) FROM HEAD OF SEGMENT	TOTAL DISTANCE (MI) FROM BEGINNING	D.O. (mg/l)	CBODu (mg/l)	NBODu (mg/l)
0.000	0.000	6.583	24.293	6.830
0.100	0.100	6.657	23.902	6.696
0.200	0.200	6.706	23.516	6.565
0.300	0.300	6.740	23.137	6.436
0.400	0.400	6.765	22.764	6.310
0.500	0.500	6.786	22.397	6.136
0.600	0.600	6.804	22.036	6.065
0.700	0.700	6.820	21.681	5.946
0.800	0.800	6.835	21.332	5.830
0.900	0.900	6.850	20.988	5.715
0.910	0.910	6.851	20.954	5.704

SIMULATION COMPLETED

06-03-1988 09:09:54

SPRINGWOOD PSYCHIATRIC INSTITUTE WASTEWATER TREATMENT PLANT DISCHARGE TO LIMESTONE BRANCH

THE BACKGROUND CONDITIONS ARE:

FLOW= 0.0067 MGD D.O.= 6.890 MG/L CBODu= 3.00 MG/L NBODu= 0.00 MG/L

OUTPUT WILL BE GENERATED EVERY 0.10 MILE FROM THE BEGINNING OF A SEGMENT

THE VARIABLES FOR SECTION 1 ARE:

SEGMENT LENGTH = 0.91 MI VELOCITY = 3.273 MI/D
TEMP. = 30.0 xC ELEV = 237.00 FT SATURATION D.O. = 7.656 MG/L
Ka = 15.000 /DAY Kr = 0.168 /DAY Kn = 0.600 /DAY

The k rates shown are at 20 degrees C. The model corrects them.

FOR THE DISCHARGE AT THE BEGINNING OF THE SEGMENT:

FLOW= 0.0250 MGD D.O.= 6.50 MG/L CBODu= 30.00 MG/L NBODu= 8.66 MG/L

THE RESULTS FOR SECTION 1 ARE:

DISTANCE (MI) FROM HEAD OF SEGMENT	TOTAL DISTANCE (MI) FROM BEGINNING	D.O. (mg/l)	CBODu (mg/l)	NBODu (mg/l)
0.000	0.000	6.583	24.293	6.830
0.100	0.100	6.706	24.097	6.565
0.200	0.200	6.784	23.902	6.310
0.300	0.300	6.836	23.708	6.065
0.400	0.400	6.874	23.516	5.830
0.500	0.500	6.903	23.326	5.603
0.600	0.600	6.927	23.137	5.386
0.700	0.700	6.948	22.950	5.177
0.800	0.800	6.967	22.764	4.976
0.900	0.900	6.985	22.580	4.783
0.910	0.910	6.987	22.562	4.764

SIMULATION COMPLETED

06-03-1988 09:13:30

double K_n
Sensitivity Run
6.89
6.583
.307
ΔDO

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to UT, LIMESTONE BRANCH.

File Information

File Name:	I:\sdmackert\North Spring WWTP Run 2.mod
Date Modified:	January 27, 2010

Water Quality Standards Information

Stream Name:	UT, LIMESTONE BRANCH
River Basin:	Potomac/Shenandoah Rivers Basin
Section:	8
Class:	III - Nontidal Waters (Coastal and Piedmont)
Special Standards:	PWS

Background Flow Information

Gauge Used:	USGS Gauge at Catoctin Creek
Gauge Drainage Area:	89.6 Sq.Mi.
Gauge 7Q10 Flow:	0.71 MGD
Headwater Drainage Area:	3.65 Sq.Mi.
Headwater 7Q10 Flow:	2.892299E-02 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	0 MGD
Incremental Flow in Segments:	7.924107E-03 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	25 Degrees C
Background cBOD5:	2 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.436029 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	250 ft above MSL
Model End Elevation:	237 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0

Model Input File for the Discharge to UT, LIMESTONE BRANCH.

Segment Information for Segment 1

Definition Information

Segment Definition:	A discharge enters.
Discharge Name:	NORTH SPRING BEHAVIORAL HEALTHCARE WWTP
VPDES Permit No.:	

Discharger Flow Information

Flow:	0.016 MGD
cBOD5:	15 mg/l
TKN:	5 mg/l
D.O.:	6.5 mg/l
Temperature:	25 Degrees C

Geographic Information

Segment Length:	0.91 miles
Upstream Drainage Area:	3.65 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	250 Ft.
Downstream Elevation:	237 Ft.

Hydraulic Information

Segment Width:	4 Ft.
Segment Depth:	0.098 Ft.
Segment Velocity:	0.177 Ft./Sec.
Segment Flow:	0.045 MGD
Incremental Flow:	-0.029 MGD (Applied at end of segment.)

Channel Information

Cross Section:	Rectangular
Character:	Mostly Straight
Pool and Riffle:	No
Bottom Type:	Gravel
Sludge:	None
Plants:	None
Algae:	None

"Model Run For I:\sdmackert\North Spring WWTP Run 2.mod On 1/27/2010 2:26:45 PM"

"Model is for UT, LIMESTONE BRANCH."
"Model starts at the NORTH SPRING BEHAVIORAL HEALTHCARE WWTP discharge."

"Background Data"

"7Q10"	"cBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.0289,	2,	0,	7.436,	25

"Discharge/Tributary Input Data for Segment 1"

"Flow"	"cBOD5"	"TKN"	"DO"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.016,	15,	5,	,6.5,	25

"Hydraulic Information for Segment 1"

"Length"	"Width"	"Depth"	"Velocity"
"(mi)"	"(ft)"	"(ft)"	"(ft/sec)"
.91,	4,	.098,	.177

"Initial Mix Values for Segment 1"

"Flow"	"DO"	"cBOD"	"nBOD"	"DOSat"	"Temp"
"(mgd)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"(mg/l)"	"deg C"
.0449,	7.103,	16.575,	3.084,	8.264,	25

"Rate Constants for Segment 1. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
1.2,	1.51,	8.571,	9.651,	.4,	.588,	0,	0

"Output for Segment 1"
"Segment starts at NORTH SPRING BEHAVIORAL HEALTHCARE WWTP"

"Total" "Dist."	"Segm." "Dist."	"DO"	"cBOD"	"nBOD"
"(mi)"	"(mi)"	"(mg/l)"	"(mg/l)"	"(mg/l)"
0,	0,	7.103,	16.575,	3.084
.1,	.1,	6.664,	15.733,	3.022
.2,	.2,	6.387,	14.934,	2.961
.3,	.3,	6.224,	14.175,	2.902
.4,	.4,	6.141,	13.455,	2.844
.5,	.5,	6.114,	12.772,	2.787
.6,	.6,	6.125,	12.123,	2.731
.7,	.7,	6.162,	11.507,	2.676
.8,	.8,	6.216,	10.923,	2.622
.9,	.9,	6.28,	10.368,	2.569
.91,	.91,	6.287,	10.314,	2.564

"END OF FILE"

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on 1) a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Loudoun County, Virginia, and 2) a proposed modification to the completed Total Maximum Daily Load (TMDL) study for that same water body.

PUBLIC COMMENT PERIOD: June 30, 2011 to 5:00 p.m. on July 29, 2011

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: North Spring Behavioral Healthcare, 42009 Victory Lane, Leesburg, VA 20176, VA0067938

NAME AND ADDRESS OF FACILITY: North Spring Behavioral Healthcare WWTP, 42009 Victory Lane, Leesburg, VA 20176

PROJECT DESCRIPTION – PERMIT REISSUANCE: North Spring Behavioral Healthcare has applied for a reissuance of a permit for the private North Spring Behavioral Healthcare WWTP. The applicant proposes to release treated sewage wastewaters from a residential area at a re-rating of 0.016 million gallons per day into a water body. Sludge from the treatment process will be transported to the Broad Run Water Reclamation Facility for further treatment and disposal. The facility proposes to release the treated sewage in an unnamed tributary to Limestone Branch in Loudoun County in the Potomac watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, BOD, Total Suspended Solids, Dissolved Oxygen, Ammonia, *E. coli,* and Chlorine.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requestor, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

TMDL STUDY MODIFICATION: The Limestone Branch Bacteria TMDL was approved by the United States Environmental Protection Agency (EPA) on July 6, 2004. The TMDL included a waste load allocation (WLA) for North Spring Behavioral Healthcare WWTP (VPDES Permit Number VA0067938) based on their maximum permitted design flow at the time of TMDL completion (0.010 million gallons per day). North Spring Behavioral Healthcare has requested a re-rating of their maximum permitted design flow to 0.016 million gallons per day.

In the original TMDL, discharges from permitted point sources were increased by two and five times the existing permit levels to determine the effect of possible expansion by current facilities, or the issuance of new permits within the watershed. The increases did not result in additional exceedances of the water quality standard. Thus, the TMDL will be modified to include this expanded discharge.

HOW TO COMMENT ON THE TMDL MODIFICATION: DEQ accepts comments by e-mail, fax or postal mail. All comments must be in writing and be received by DEQ during the comment period. The public also may request a public meeting. Written comments should include the names, mailing addresses and telephone numbers of the person commenting. To review the draft TMDL modification, please contact Katie Conaway at katie.conaway@deq.virginia.gov; (703) 583-3804.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the documents at the DEQ-Northern Regional Office by appointment, or may request electronic copies of the draft permit and fact sheet.
Name: Susan Mackert
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3853 E-mail: susan.mackert@deq.virginia.gov Fax: (703) 583-3821

Revised 2/2003

State "Transmittal Checklist" to Assist in Targeting
Municipal and Industrial Individual NPDES Draft Permits for Review

Part I. State Draft Permit Submission Checklist

In accordance with the MOA established between the Commonwealth of Virginia and the United States Environmental Protection Agency, Region III, the Commonwealth submits the following draft National Pollutant Discharge Elimination System (NPDES) permit for Agency review and concurrence.

Facility Name:	North Spring Behavioral Healthcare WWTP
NPDES Permit Number:	VA0067938
Permit Writer Name:	Susan Mackert
Date:	February 5, 2010

Major [ ] **Minor** [X] **Industrial** [ ] **Municipal** [X]

I.A. Draft Permit Package Submittal Includes:	**Yes**	**No**	**N/A**
1. Permit Application?	X		
2. Complete Draft Permit (for renewal or first time permit – entire permit, including boilerplate information)?	X		
3. Copy of Public Notice?	X		
4. Complete Fact Sheet?	X		
5. A Priority Pollutant Screening to determine parameters of concern?	X		
6. A Reasonable Potential analysis showing calculated WQBELs?	X		
7. Dissolved Oxygen calculations?	X		
8. Whole Effluent Toxicity Test summary and analysis?			X
9. Permit Rating Sheet for new or modified industrial facilities?			X

I.B. Permit/Facility Characteristics	**Yes**	**No**	**N/A**
1. Is this a new, or currently unpermitted facility?		X	
2. Are all permissible outfalls (including combined sewer overflow points, non-process water and storm water) from the facility properly identified and authorized in the permit?	X		
3. Does the fact sheet **or** permit contain a description of the wastewater treatment process?	X		
4. Does the review of PCS/DMR data for at least the last 3 years indicate significant non-compliance with the existing permit?		X	
5. Has there been any change in streamflow characteristics since the last permit was developed?		X	
6. Does the permit allow the discharge of new or increased loadings of any pollutants?	X		
7. Does the fact sheet **or** permit provide a description of the receiving water body(s) to which the facility discharges, including information on low/critical flow conditions and designated/existing uses?	X		
8. Does the facility discharge to a 303(d) listed water?		X	
a. Has a TMDL been developed and approved by EPA for the impaired water?	X		
b. Does the record indicate that the TMDL development is on the State priority list and will most likely be developed within the life of the permit?			X
c. Does the facility discharge a pollutant of concern identified in the TMDL or 303(d) listed water?	X		
9. Have any limits been removed, or are any limits less stringent, than those in the current permit?		X	
10. Does the permit authorize discharges of storm water?		X	

I.B. Permit/Facility Characteristics – cont.	**Yes**	**No**	**N/A**
11. Has the facility substantially enlarged or altered its operation or substantially increased its flow or production?	X		
12. Are there any production-based, technology-based effluent limits in the permit?		X	
13. Do any water quality-based effluent limit calculations differ from the State's standard policies or procedures?		X	
14. Are any WQBELs based on an interpretation of narrative criteria?		X	
15. Does the permit incorporate any variances or other exceptions to the State's standards or regulations?		X	
16. Does the permit contain a compliance schedule for any limit or condition?		X	
17. Is there a potential impact to endangered/threatened species or their habitat by the facility's discharge(s)?		X	
18. Have impacts from the discharge(s) at downstream potable water supplies been evaluated?	X		
19. Is there any indication that there is significant public interest in the permit action proposed for this facility?		X	
20. Have previous permit, application, and fact sheet been examined?	X		

Part II. NPDES Draft Permit Checklist

Region III NPDES Permit Quality Checklist – for POTWs

II.A. Permit Cover Page/Administration	**Yes**	**No**	**N/A**
1. Does the fact sheet or permit describe the physical location of the facility, including latitude and longitude (not necessarily on permit cover page)?	X		
2. Does the permit contain specific authorization-to-discharge information (from where to where, by whom)?	X		

II.B. Effluent Limits – General Elements	**Yes**	**No**	**N/A**
1. Does the fact sheet describe the basis of final limits in the permit (e.g., that a comparison of technology and water quality-based limits was performed, and the most stringent limit selected)?	X		
2. Does the fact sheet discuss whether "antibacksliding" provisions were met for any limits that are less stringent than those in the previous NPDES permit?	X		

II.C. Technology-Based Effluent Limits (POTWs)	**Yes**	**No**	**N/A**
1. Does the permit contain numeric limits for ALL of the following: BOD (or alternative, e.g., CBOD, COD, TOC), TSS, and pH?	X		
2. Does the permit require at least 85% removal for BOD (or BOD alternative) and TSS (or 65% for equivalent to secondary) consistent with 40 CFR Part 133?	X		
a. If no, does the record indicate that application of WQBELs, or some other means, results in more stringent requirements than 85% removal or that an exception consistent with 40 CFR 133.103 has been approved?			X
3. Are technology-based permit limits expressed in the appropriate units of measure (e.g., concentration, mass, SU)?	X		
4. Are permit limits for BOD and TSS expressed in terms of both long term (e.g., average monthly) and short term (e.g., average weekly) limits?	X		
5. Are any concentration limitations in the permit less stringent than the secondary treatment requirements (30 mg/l BOD5 and TSS for a 30-day average and 45 mg/l BOD5 and TSS for a 7-day average)?		X	
a. If yes, does the record provide a justification (e.g., waste stabilization pond, trickling filter, etc.) for the alternate limitations?			X

II.D. Water Quality-Based Effluent Limits	**Yes**	**No**	**N/A**
1. Does the permit include appropriate limitations consistent with 40 CFR 122.44(d) covering State narrative and numeric criteria for water quality?	X		
2. Does the fact sheet indicate that any WQBELs were derived from a completed and EPA approved TMDL?	X		
3. Does the fact sheet provide effluent characteristics for each outfall?	X		
4. Does the fact sheet document that a "reasonable potential" evaluation was performed?	X		
a. If yes, does the fact sheet indicate that the "reasonable potential" evaluation was performed in accordance with the State's approved procedures?	X		
b. Does the fact sheet describe the basis for allowing or disallowing in-stream dilution or a mixing zone?	X		
c. Does the fact sheet present WLA calculation procedures for all pollutants that were found to have "reasonable potential"?	X		
d. Does the fact sheet indicate that the "reasonable potential" and WLA calculations accounted for contributions from upstream sources (i.e., do calculations include ambient/background concentrations)?			X
e. Does the permit contain numeric effluent limits for all pollutants for which "reasonable potential" was determined?	X		

II.D. Water Quality-Based Effluent Limits – cont.	Yes	No	N/A
5. Are all final WQBELs in the permit consistent with the justification and/or documentation provided in the fact sheet?	X		
6. For all final WQBELs, are BOTH long-term AND short-term effluent limits established?	X		
7. Are WQBELs expressed in the permit using appropriate units of measure (e.g., mass, concentration)?	X		
8. Does the record indicate that an "antidegradation" review was performed in accordance with the State's approved antidegradation policy?	X		

II.E. Monitoring and Reporting Requirements	Yes	No	N/A
1. Does the permit require at least annual monitoring for all limited parameters and other monitoring as required by State and Federal regulations?	X		
a. If no, does the fact sheet indicate that the facility applied for and was granted a monitoring waiver, AND, does the permit specifically incorporate this waiver?			X
2. Does the permit identify the physical location where monitoring is to be performed for each outfall?	X		
3. Does the permit require at least annual influent monitoring for BOD (or BOD alternative) and TSS to assess compliance with applicable percent removal requirements?			X
4. Does the permit require testing for Whole Effluent Toxicity?		X	

II.F. Special Conditions	Yes	No	N/A
1. Does the permit include appropriate biosolids use/disposal requirements?	X		
2. Does the permit include appropriate storm water program requirements?			X
3. If the permit contains compliance schedule(s), are they consistent with statutory and regulatory deadlines and requirements?			X
4. Are other special conditions (e.g., ambient sampling, mixing studies, TIE/TRE, BMPs, special studies) consistent with CWA and NPDES regulations?		X	
5. Does the permit allow/authorize discharge of sanitary sewage from points other than the POTW outfall(s) or CSO outfalls [i.e., Sanitary Sewer Overflows (SSOs) or treatment plant bypasses]?		X	
6. Does the permit authorize discharges from Combined Sewer Overflows (CSOs)?		X	
a. Does the permit require implementation of the "Nine Minimum Controls"?			X
b. Does the permit require development and implementation of a "Long Term Control Plan"?			X
c. Does the permit require monitoring and reporting for CSO events?			X
7. Does the permit include appropriate Pretreatment Program requirements?		X	

II.G. Standard Conditions	Yes	No	N/A
1. Does the **permit** contain all 40 CFR 122.41 standard conditions or the State equivalent (or more stringent) conditions?	X		

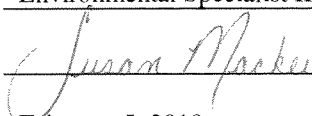
List of Standard Conditions – 40 CFR 122.41

Duty to comply	Property rights	Reporting Requirements
Duty to reapply	Duty to provide information	Planned change
Need to halt or reduce activity	Inspections and entry	Anticipated noncompliance
not a defense	Monitoring and records	Transfers
Duty to mitigate	Signatory requirement	Monitoring reports
Proper O & M	Bypass	Compliance schedules
Permit actions	Upset	24-Hour reporting
		Other non-compliance

2. Does the permit contain the additional standard condition (or the State equivalent or more stringent conditions) for POTWs regarding notification of new introduction of pollutants and new industrial users [40 CFR 122.42(b)]?	X		

Part III. Signature Page

Based on a review of the data and other information submitted by the permit applicant, and the draft permit and other administrative records generated by the Department/Division and/or made available to the Department/Division, the information provided on this checklist is accurate and complete, to the best of my knowledge.

Name	Susan Mackert
Title	Environmental Specialist II Senior
Signature	
Date	February 5, 2010